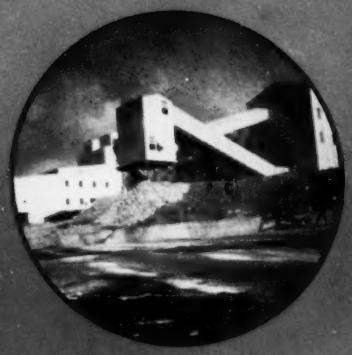
MINING WORLD



in this issue

Open Pit Zinc From ASARCO'S Van Stone

Page 26

IL 1, 1953

15 No. 4

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are replacing expensive chutes and grizzlies in production loading. You can save eight ways by using your Eimcos in drawhole loading.

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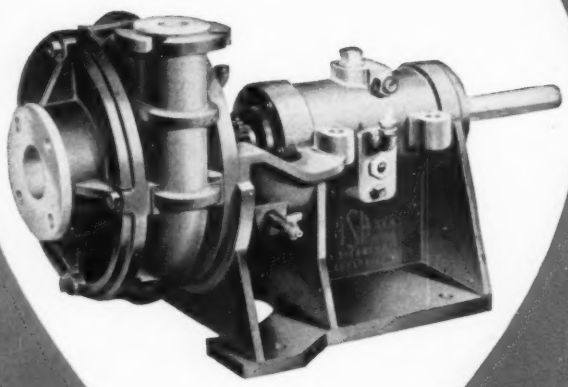
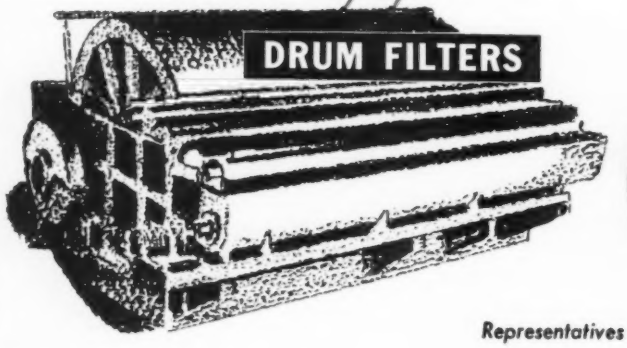
THE HEART OF THE PROCESS

Proper functioning of each component in a process depends on the kind of steady performance that you get from Hydroseal Pumps . . . and the kind of experience that assures the proper application of control equipment. Ask an operator who uses Hydroseals. Then ask our engineers to help you.

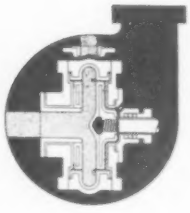


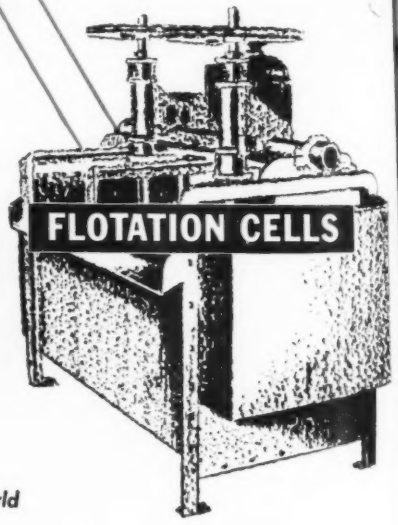
CYCLONES

SPIRALS



DRUM FILTERS





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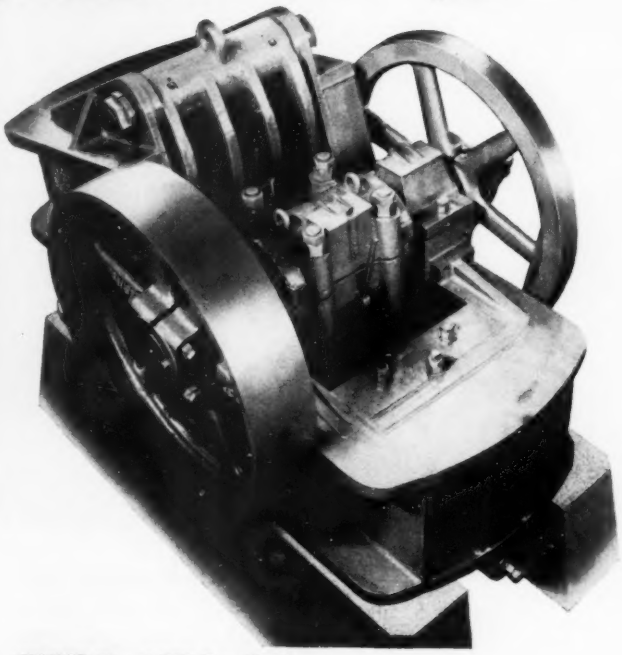


TRAYLOR H and HB Jaw Crushers are made in 14 sizes. Feed openings from 8" x 12" to 56" x 72". Capacities from 4 to 640 tons per hour.

Traylor Curved Jaw Plates outwear conventional types three to one

In scores of installations, the records show that Traylor Curved Jaw Plates outlast ordinary plates 3 to 1. For instance, records kept on a 36" x 48" crusher set at 4" to 5" show the average life of straight jaw plates to be 96,500 tons per set. Traylor curved Jaw Plates fitted to this crusher, and set at 3" to 3½", averaged 276,724 tons.

Here's why: Traylor Curved Jaw Plates apply power as a direct crushing force. The swing jaw plate exerts power directly counter to its opposing plate. This lessens lifting and churning of material to greatly reduce plate wear. As wear does gradually occur, it is evenly distributed so that Traylor plates retain their original curved shapes indefinately.

Although Traylor Jaw Crushers offer greater capacities . . . even at finer settings . . . they actually reduce power requirements. For the full story, clip the coupon and get our illustrated bulletin.

TRAYLOR ENGINEERING & MFG., CO.
573 MILL ST., ALLENTOWN, PA.

SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

A **Traylor** LEADS TO GREATER PROFITS

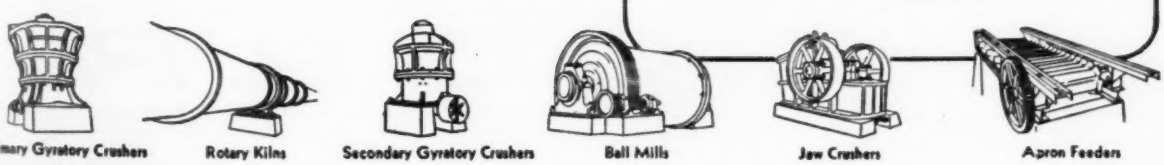
Send complete specifications and descriptions of Traylor H and HB Jaw Crushers immediately.

Name: _____

Position: _____

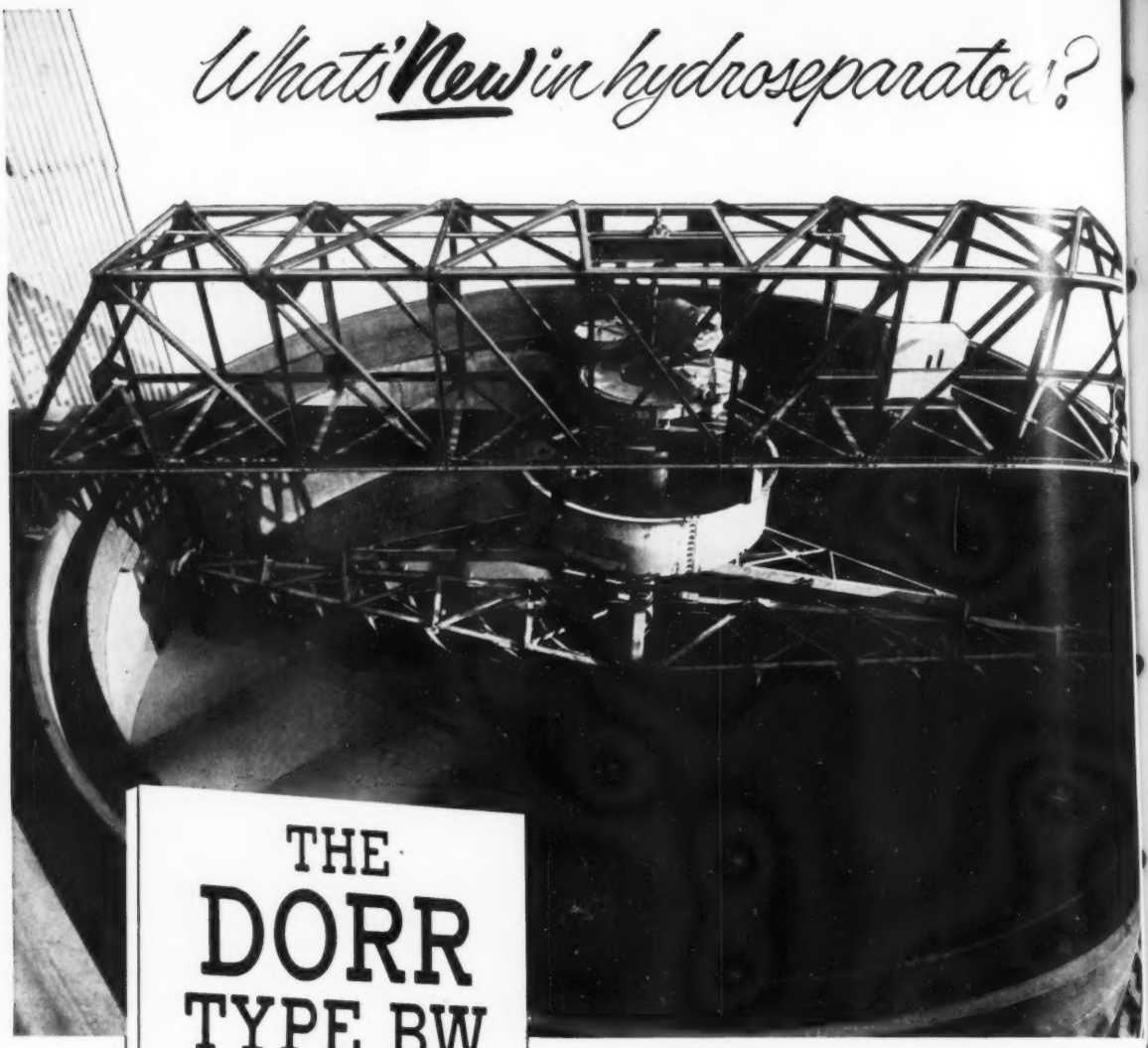
Company: _____

Address: _____ State: _____



Primary Gyratory Crushers | Rotary Kilns | Secondary Gyratory Crushers | Ball Mills | Jaw Crushers | Apron Feeders

What's *New* in hydroseparators?



THE DORR TYPE BW

a rugged center-shaft mechanism in the 40 to 75′ diameter range.

Newest addition to the Dorr line of hydroseparators is the Type BW — a modification of the thoroughly proven and accepted Type H introduced several years ago. It is the *economical* answer to the problem of handling granular solids which do not warrant the use of the heavier Type H — but which are too heavy for a standard unit. Here are its major features...

Power to spare when you need it . . . through the BW's heavy-duty balanced worm and spur-gear drive.

Positive overload protection . . . by means of an automatic hydraulic lifting device activated by the torsional load on the mechanism. When an overload is encountered the rakes raise quickly — then lower slowly as the overload is reduced.

Unique Center-Shaft Design . . . combining an outer drive tube to which the pivoted drive rods are hinged and an inner lift tube which carries the rake arms.

Free, center-cone discharge — entire rake and drive mechanism is supported by a truss spanning the tank. Result . . . a clear center-cone area . . . providing unimpeded discharge of heavy solids.

The Type BW is available in diameters ranging from 40 to 75 feet. We'd like to tell you how it can fit into your picture economically . . . without obligation of course.

Better tools TODAY to meet tomorrow's demand

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MINING WORLD

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 15 **APRIL 1953** NUMBER 4

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THE COVER MAP: Newest of the major zinc mines brought into operation in the last year is the Van Stone of the American Smelting and Refining Company near Northport, Washington. It is the company's first major open pit mine in the United States. The picture shows the 1,000 ton per day advanced design flotation mill and the crushing plant (right).

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WORLD MINING is published the 26th of each month as a regular department of MINING WORLD and is also circulated as a separate publication on a carefully controlled free basis to a selected list of management and supervisory personnel associated with active mining enterprises throughout the world.

GRAB SAMPLES From the Mail

Overrated U.O. Report

Dear Sir:

I note that in the November 1952 issue on pages 43 and 60 you have a paragraph on the discovery of uranium in southwestern Tasmania and the articles imply that the discovery was made by means of an aerial survey flight. I would like to point out that the only signs of radioactivity discovered in this area have been found by the use of Geiger counters carried by small prospecting parties, some of whom have been flown into the area and landed on the beach at Lake Pedder or Port Davey. No airborne scintillometer work has been done. Indications from the Geiger counters were very poor and in all probability represented small concentrations of monazite.

No uranium has been discovered to date, and what is known of the geology of the area makes it unlikely that there is any present.

Maxwell R. Banks
Acting Head, Geology Department
University of Tasmania, Sandy Bay
Hobart, Tasmania

Carried Over Rough Country

Dear Sir:

Your letter of June 18th, 1952 reached me on December 9th. I hope you will excuse the apparent discourtesy of my not having replied. Owing to the present conditions in this area it is not possible for mail to reach me directly and it has to be forwarded as opportunity offers from Rangoon.

It might be of interest to you to know that all of our mail has to be carried over particularly rough country for almost 100 miles in order to reach the mine.

Although my copy of the magazine reaches me approximately six months after publication I still find it of great interest, both for its technical articles and for the news of what is happening in mining fields elsewhere in the world. I express my thanks for the information and pleasure it has so far given me.

J. Fleming
Acting General Manager
The Mawchi Mines, Limited
Burma

Manager to Consultant

Dear Sir:

As cyanide manager of the Randfontein Estates Gold Mining Company, I used to regularly receive your valuable publication. Since my appointment as consulting metallurgist to the Johannesburg Consolidated Investment Company, Limited's group of mines, I have not been getting my copy. I would appreciate your changing of records.

R. J. Westwood
Consulting Metallurgist
J. C. I. Group
Johannesburg,
Union of South Africa

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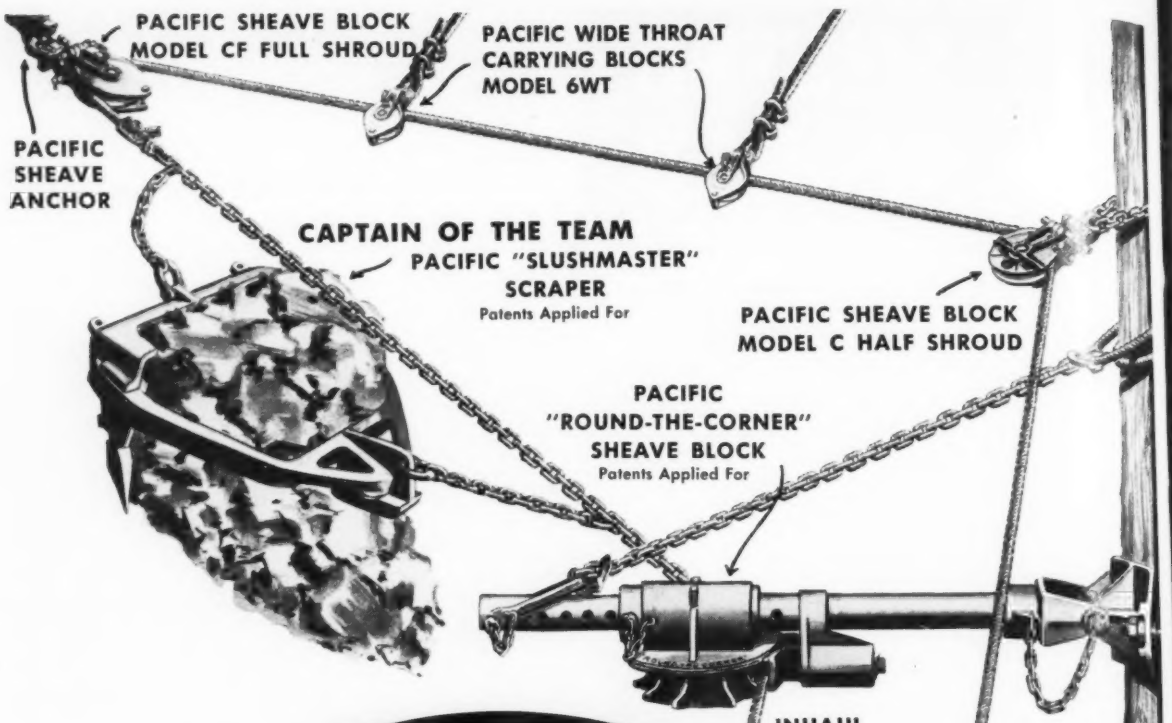

Pacific Teamwork Pays off

MORE ORE AT LESS COST

Pacific Products, working together, provide an unbeatable combination for getting out more ore at less cost. Write for Bulletin 215.

★

Be Specific — Order Pacific Jaw Crushers, Sheave Anchors, Bit Knockers and Pacific Wearing Parts.

★

TO HOIST

ALLOY STEEL & METALS CO.

1862 E. 55TH ST., LOS ANGELES 58, CALIFORNIA

MAILING ADDRESS:
BOX 15323 VERNON STATION,
LOS ANGELES 58, CALIFORNIA

Smooth starting is important in grinding mills, too!

Traylor Grinding Mills require less power

The starting torque of a machine largely determines its power requirements. In addition, the greatest wear occurs from the time a machine is first started until it reaches its normal operating speed.

This is very true of grinding mills. Traylor has solved this problem by using main bearings of Meehanite* metal. Each bearing is fitted with a high pressure Alemite pump. This pump coats the trunnion with a film of grease which lifts and floats the mill to overcome high starting torques and eliminates undue wear caused by "dry" starting.

If you have a grinding problem, clip coupon for bulletin 7121. You'll be off to a good start in solving it with a Traylor grinding mill.

TRAYLOR ROD MILLS produce a more uniform granular product than other types of horizontal grinders.

TRAYLOR COMPARTMENT MILLS use a single power source and drive to complete several grinding operations.

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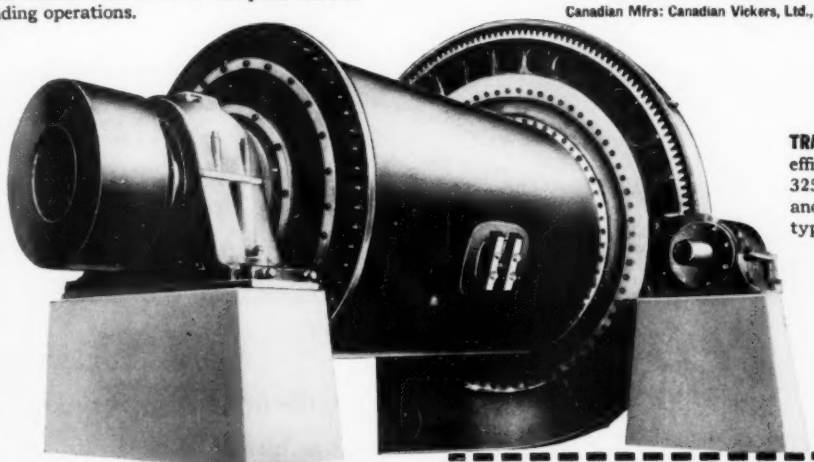

TRAYLOR BALL MILLS grind efficiently to 200, even 325 mesh. Both overflow and diaphragm discharge types available.

A Traylor LEADS TO GREATER PROFITS

Send complete information on Traylor's full line of grinding mills.

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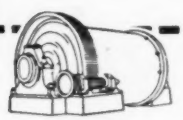
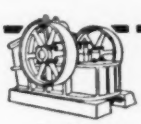
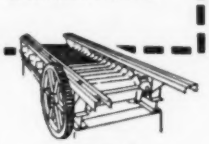
Rotary Kilns

Secondary Gyratory Crushers


Ball Mills


Jaw Crushers


Apron Feeders

REPEAT ORDER for 84" Akins Separator on Iron Range

ORDER BASED ON ACTUAL OPERATING RESULTS

One of the large companies on the Iron Range installed an 84" Akins Separator in its pilot plant. It was so successful in making the desired separation that another 84" Akins was ordered for one of their other plants.

You, too, can have all of the advantages of Akins' outstanding metallurgical and mechanical performance.

Write for Heavy Media Separation Bulletin No. 49

• • • • *Akins—the ORIGINAL spiral-type classifier* • • •

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5 reasons why modern mines buy Willison Automatic Couplers

1 SAFE

Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

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All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willison couplers eliminates damaging slack . . . permits higher speeds with maximum stability . . . reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

WRITE TODAY for Folder 5452 for more information on Willison Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

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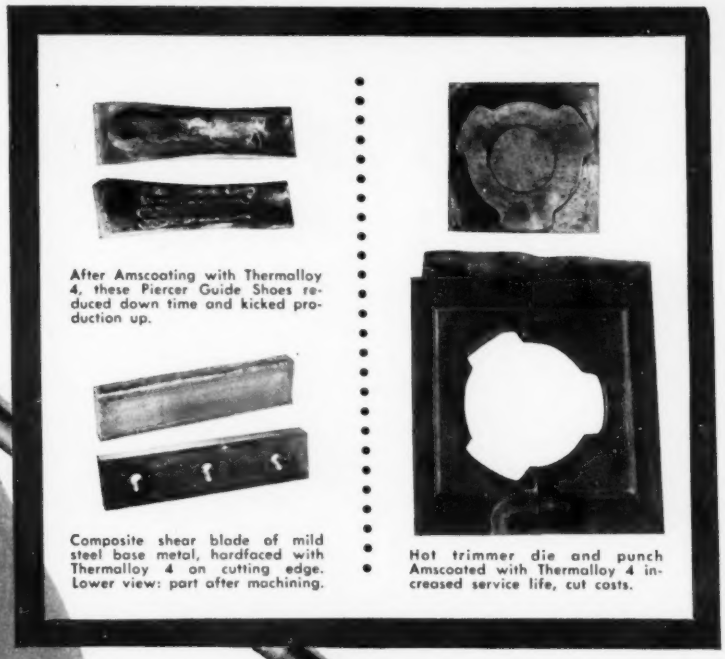

After Amscoating with Thermalloy 4, these Piercer Guide Shoes reduced down time and kicked production up.

Composite shear blade of mild steel base metal, hardfaced with Thermalloy 4 on cutting edge. Lower view: part after machining.

Hot trimmer die and punch Amscoated with Thermalloy 4 increased service life, cut costs.

BEAT HEAT WEAR and IMPACT with AMSCO THERMALLOY 4

If you have a wear problem involving high temperatures and requiring resistance to impact, this new Amsco hardfacing electrode can save you time and money

Elevated temperatures are tough to cope with in situations involving thermal shock, metal-to-metal wear, hot gas corrosion, high temperature oxidation—especially when you need great impact resistance. Here's where Amsco Thermalloy 4 can step in and give you longer service life, and big savings in time and money.

Supplied as both a composite coated electrode for electric welding or as a bare cast rod for gas welding, both types deposit a high-carbon stainless alloy containing chromium and nickel as the principle alloying elements. In many applications, it can replace expensive nickel base alloy materials. Thermalloy 4 is packaged in 50-lb. boxes or in 10-lb. packages in 50-lb. boxes. For detailed analyses and other pertinent information, write for catalog sheet on Thermalloy 4 or contact your nearest Amsco distributor.

AMSCOATING
THE RIGHT WAY TO SAY HARDFACING

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
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Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; St. Louis, Mo.; Los Angeles, Calif.
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Replaces 7 trucks with 2 Tournarockers on tough coal stripping job

Portion of haul road, showing deep standing water . . . with soft, rutted incline in the distance. Hauling under these tough conditions, the 2 Tournarockers totaled 4,000 hours with 95% mechanical efficiency.

With heaped load, Tournarocker starts 300' haul to fill. Rig's ability to turn 90° in 13'9" radius speeds cycle. Says Owner Chapman: "One feature we particularly like about these machines is the way we can turn them around without stopping in our narrow cuts."

H. T. Chapman **of Elkins, West Virginia — stripping 1,500,000 yds. of shale for the Phil Williams Coal Co. near Elkins — has a serious haul problem on his hands. During much of the year working conditions are very bad. Steady rains, combined with poor drainage, continually saturate haul roads and material. At times, parts of the haul must be made through 30" of water. Access roads are wet, spongy, and practically bottomless in places.**

"Only equipment that can do job"

When it became apparent that dump trucks couldn't work efficiently under these conditions, Chapman tried 2 rear-dump C Tournarockers. With their traction advantages—front-wheel drive, big high-flotation tires and power-proportioning differential (which automatically applies up to 4 times the power of slipping drive-wheel to wheel on firmer ground) — these rigs really did the trick! After several months' use Chapman observed, "Tournarockers are the only pieces of equipment that could do the job. My 2 'C's' have replaced 7 trucks!"

Move 220 yds. of overburden hourly

Company records covering several typical months of stripping show the 2 Tournarockers average 11 cu. yds. (almost 15 tons) of hard blue shale per load. On a soupy 600' cycle, each rig makes 10 trips per hour . . . hauls 1100 yds. (1500 tons) per 10-hour day.

Also haul coal, 22 yds. per load

The 2 "C's" have also been used to haul coal. On this work, they move about 22 cu. yds. per load. Average 12,000' cycles are completed every 15 to 20 minutes—in spite of travel through 800' of belly-deep mud, up 700' of 16% unfavorable grade and down 200' of 30% favorable grade. That's 3 to 4 trips (66 to 88 cu. yds.) per hour for each rig.

Whenever *you* have coal, rock, ore, or other shovel material to haul, it will pay you to check the output of fast rear-dump Tournarockers. Write for complete facts and figures on work like yours. We'll be glad to arrange a demonstration for you at your convenience.

LETOURNEAU EQUIPMENT

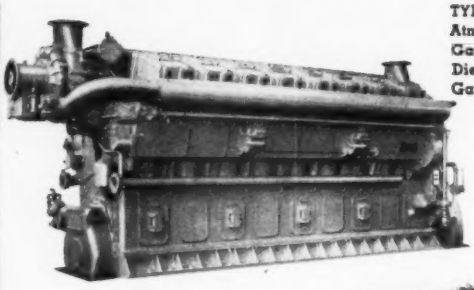
R. G. LeTOURNEAU, INC.

Peoria, Illinois

Tournarocker is shovel-loaded with 11 yds. (15 tons) of well-blasted shale. About 10% of chunks are too big to clear 2-yd. bucket. Note restricted loading area. Rig's low, wide, open bowl makes easy shovel target . . . speeds loading, boosts daily output.

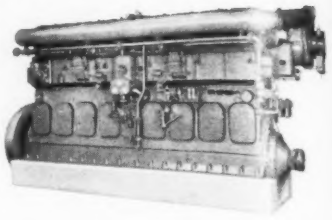
At fill, Operator Dayley Collett backs Tournarocker to edge of bank, flips fingertip "dump" button, drops load clean over bank. Reports Collett, "What I like most is the easy way these Tournarockers handle. They turn around with plenty of room to spare."

Tournarocker—Trademark Reg. U. S. Pat. Off. R-221-CM



TYPE LSV ..... 12 or 16 cyl.
Atmospheric and Supercharged
Gas ..... 1440 to 5000 hp.
Diesel ..... 1650 to 5000 hp.
Gas-Diesel ..... 1650 to 5000 hp.

● Identified here are five of the most popular Cooper-Bessemer engine types — in a power range from 300 to 5000 bhp. Not only does each type offer variety in the number of cylinders, but most are available as gas engines, gas-diesels or full diesels. Moreover each type comes either atmospheric or supercharged.



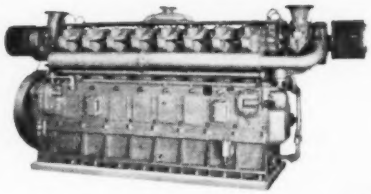
TYPE LS ..... 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 720 to 2500 hp.
Diesel ..... 825 to 2500 hp.
Gas-Diesel ..... 825 to 2500 hp.

WHEN IT COMES TO POWER...

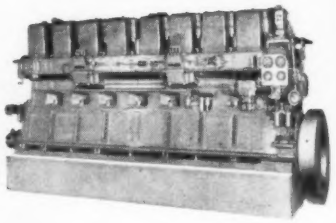
the better it "fits", the less it costs!

This gives you some idea of how well Cooper-Bessemer is prepared to meet your mobile or stationary power requirements — and with engine qualities that mean a whale of a difference in trouble-free, low-cost service!

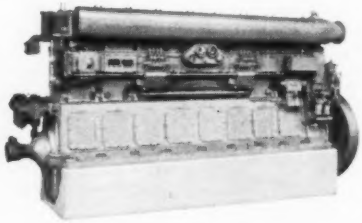
And remember, Cooper-Bessemer's modern motor and engine-driven air compressors are setting equally enviable records of superior performance. Specify your service needs and ask for descriptive bulletins on Cooper-Bessemer engines, air compressors or both.



TYPE FV ..... 8, 12 or 16 cyl.
Diesel — Atmospheric .. 430 to 1150 hp.
Diesel — Supercharged . 1110 to 2230 hp.



TYPE JS ..... 5, 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 375 to 1815 hp.
Diesel ..... 430 to 1815 hp.
Gas-Diesel ..... 430 to 1815 hp.



TYPE GS ..... 5, 6 or 8 cyl.
Atmospheric and Supercharged
Gas ..... 320 to 1460 hp.
Diesel ..... 300 to 1460 hp.
Gas-Diesel ..... 300 to 1460 hp.

The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington, D. C. Bradford, Pa. San Francisco Houston, Dallas Greggton, Pampa and Odessa, Texas Seattle Tulsa Shreveport St. Louis Los Angeles Chicago Caracas, Venezuela Cooper-Bessemer of Canada, Ltd., Halifax, Nova Scotia Gloucester, Mass. Calmes Engineering Co., New Orleans, La.

FIGHTS THE **STEEL**

...not the MAN

Smoothly-balanced Gardner-Denver Stopers are easy to handle — even in tight stopes or from temporary staging — let your runners concentrate on greater footage. Full information in Bulletin SD-2.

SINCE 1859 **GARDNER-DENVER**

Export Division: 233 Broadway, New York 7, N.Y., U.S.A.

Gardner-Denver Company, Quincy, Illinois, U.S.A.

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

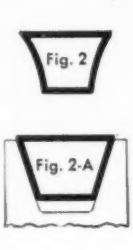
WHY
Gates V-Belts Wear Longer-

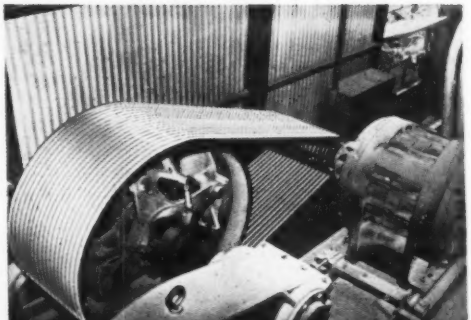
The CONCAVE SIDE (U.S. Patent No. 1813698) is what gives the Extra Wear!

Take any *straight-sided* V-Belt (Fig. 1) and bend it as it bends in going around its pulley. You will clearly see its sides *bulge out* (Fig. 1-A). These sides therefore press *unevenly* against the V-pulley and this causes extra wear at the point shown by arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2).

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means longer belt *life* and *lower* belt *costs* for you.





Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS 522

V-Belts—Hose
Molded Rubber Goods
for industry
World's Largest Maker
of V-Belts

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

New CAT* 66 HP Shovel has a bucket 8 feet wide

This is the new Caterpillar No. 6 Shovel. A glutton for work around any kind of mining job, on the surface or underground, it strips, excavates, cleans up, stockpiles, loads, 'dozes and handles haul road maintenance. Here, take a close look:

The shovel frame and tractor are welded and bolted together. This is *one* unit – big, tough and completely Caterpillar built.

That bucket is 96 in. across, scoops up 2 cu. yd. easily, and has 66 HP behind its hard-faced cutting edge of high-carbon steel. There's a 35° automatic tip-back which holds the load in the bucket, and a 50° dump angle, with impact shaking, to get rid of even the stickiest material quickly and cleanly.

The bucket is wider than the widest part of the tractor. You can work close to walls, and cut sidewalls clean, with this shovel.

Those crawler tracks are extra long and designed especially for this unit. They're non-oscillating, too, for added stability and finer grading.

The Caterpillar-built hydraulic system lets the operator raise and dump at the same time and features an automatic kick-out. And the operator sits high and clear, with excellent visibility of the bucket's sides, back and corners. Yet the unit's over-all height (6 ft. 11 in.) is low enough for working in tight places and low overhead areas.

Your Caterpillar Dealer is anxious to demonstrate the No. 6 Shovel for you. Give him a call.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

UNOBA grease helps move mountains

This giant electric shovel digs out rich copper ore with a four-cubic-yard bite. Dependable lubrication is vital to trouble-free operation of rugged equipment like this. That's why this shovel has the protective lubrication of UNOBA grease.

UNOBA gives outstanding protection against rust and corrosion. Even steam cleaning and boiling water don't cut UNOBA's film.

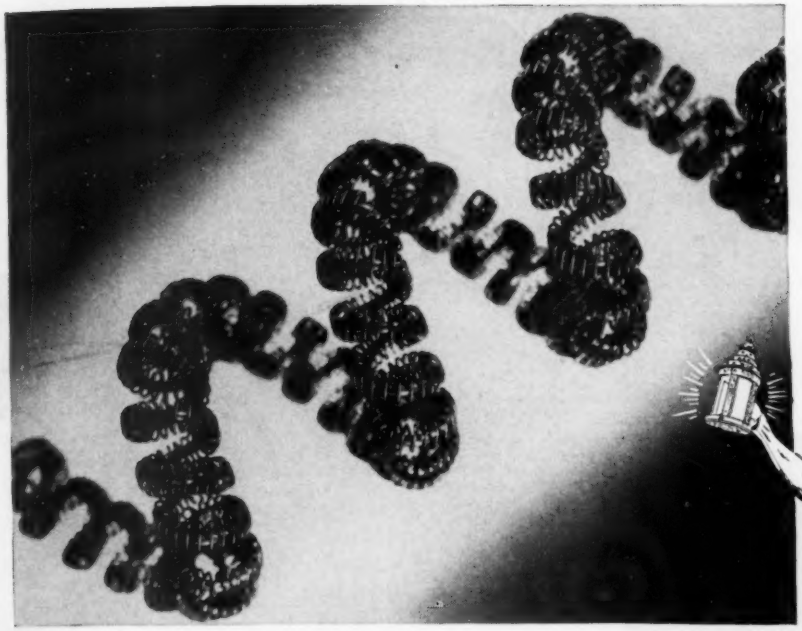
UNOBA eliminates excessive wear because its tenacious coating cushions straining and grinding gears, helps absorb shocks.

UNOBA is a multi-purpose grease. By using UNOBA you reduce grease inventories... lessen the chance of using the wrong lubricant... save yourself time and money.

Give your equipment the dependable protection of multi-purpose UNOBA grease.

Developed by the makers of DRILLUBE air drill lubricant.

UNION OIL 76 COMPANY OF CALIFORNIA



Shown at the left is a view of the triple-coil tungsten wire used in many modern fluorescent lamps. (Photo courtesy General Electric Lamps)

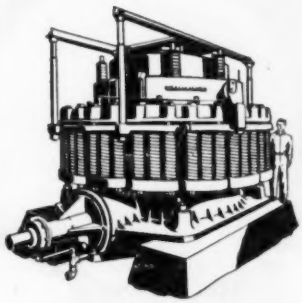
The "ARISTOCRAT OF RARE METALS" might have helped Diogenes . . .

If *TUNGSTEN*, the *"aristocrat of rare metals"*, had been discovered in his time, the Greek Cynic, *Diogenes* might have been able to carry a much brighter lamp to aid in his search for an honest man. For among the many contributions of this metal to modern civilization is the tungsten filament which gives a quality of artificial light otherwise unattainable.

Due to low grade characteristics, and the hard abrasive rock in which tungsten ore is generally found, producers must attain desired particle size for maximum recovery as quickly and economically as possible. It is significant to note the use of SYMONS® Cone Crushers by many of the large tungsten producers . . . who find these crushers particularly suited to tungsten ore reduction because of maximum utilization of crushing surfaces against the highly abrasive material, with minimum wear.

Thus, in tungsten operations . . . *as in all of the great ore and industrial mineral operations the world over* . . . SYMONS Cone Crushers are relied upon to efficiently produce great quantities of finely crushed product at low cost.

NORDBERG MFG. CO., Milwaukee, Wisconsin



SYMONS Cone Crushers...*the machines that revolutionized crushing practice*.. are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

SYMONS . . . *A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD.*

C153

NORDBERG MACHINERY

NORDBERG

CRUSHERS SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
MEXICO, D.F. • LONDON • PARIS • JOHANNESBURG

SYMONS PRIMARY CRUSHERS

GRINDING MILLS

MINE HOISTS

SYMONS VIBRATING BAR GRIZZLIES and SCREENS

DIESEL ENGINES

Here's your best wire rope buy–

Mining ropes that are about 15% stronger than Plow Steel yet cost only 5% more!

You'll get more for your money every time by using Monitor Steel grade of Tiger Brand Wire Rope in your mining operations. It's stronger, tougher, and more wear-resistant than any other standard grade of wire rope. For example, Tiger Brand Monitor Steel is about 15% stronger than Plow Steel. Yet, for all its superior qualities, Monitor Steel costs only 5% more. And because of these qualities, it is better suited to any mining-rope job you have.

As a shaft- or slope-hoist rope, Monitor Steel is stronger and more resistant to wear and fatigue. These superior properties mean greater safety and more economical operation for you.

As a slusher rope, Monitor Steel saves you money because it extends the intervals between replacements. Monitor Steel's ability to take punishment means less down-time for rope repair and replacement.

In strip mining, Monitor Steel pays off again, for it's made to give you longer, more dependable service on power shovels, dozers, and other rope-using equipment.

Remember that all of these superior qualities are yours at little extra cost. That's why Tiger Brand Monitor Steel is your best wire rope buy. It comes in a type and size to meet every mining application and requirement.

Monitor Steel has no equal for mining-rope applications and is available only in U·S·S American Tiger Brand Wire Rope. For advice on the best type of Tiger Brand Monitor Steel Wire Rope for your mining-rope jobs, you're welcome to the services of a Tiger Brand Field Specialist. Contact your local distributor or write to Columbia-Geneva Steel, 1403 Russ Building, San Francisco 6.

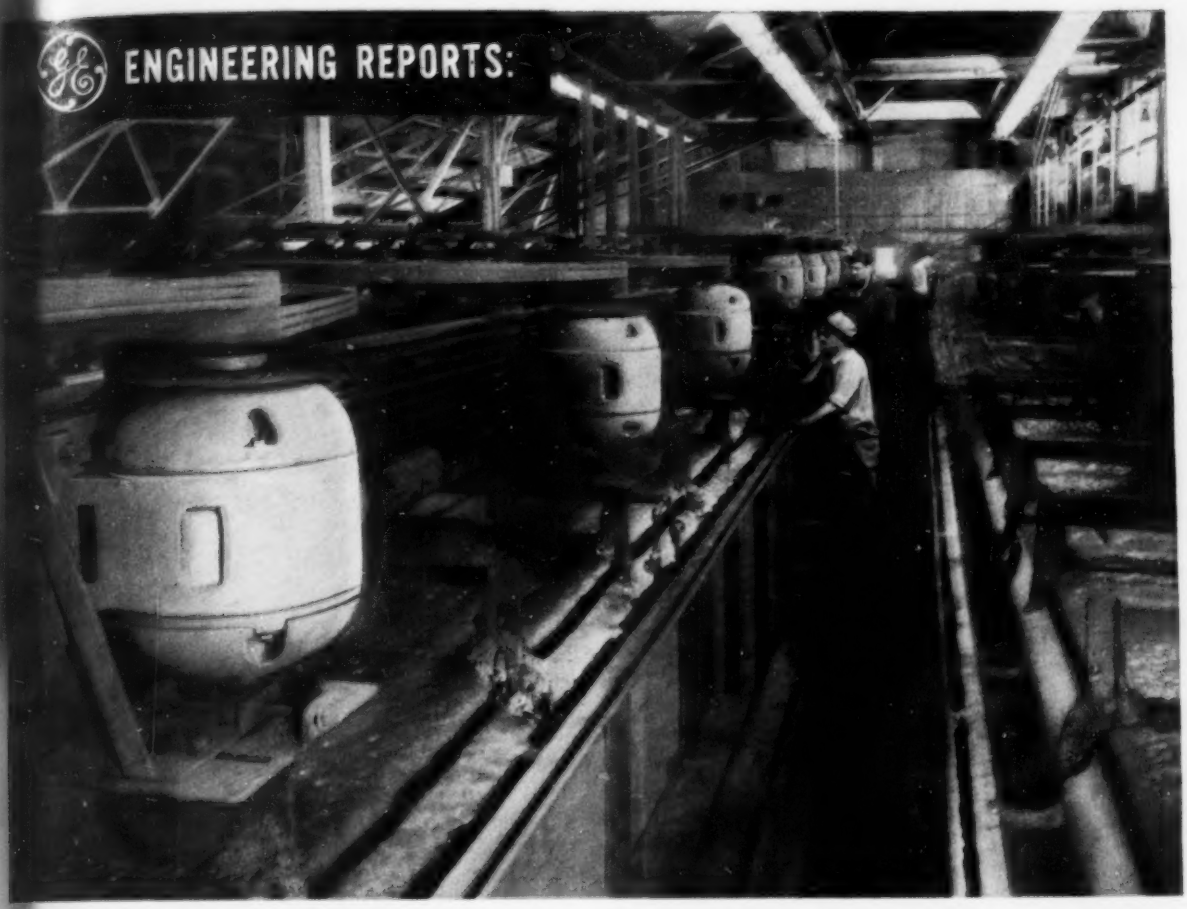
USS

U·S·S TIGER BRAND Wire Rope

Columbia-Geneva Steel Division, United States Steel Corporation, San Francisco
In the East: American Steel & Wire Division, Cleveland, Ohio

UNITED STATES STEEL

ENGINEERING REPORTS:



NEW TECHNIQUE OF COBALT FLOTATION was worked out in a pilot plant at Calera's Cobalt, Idaho installation to mill ore assaying 0.70 per cent cobalt. Reliability of the mill operation is promoted by the G-E engineered electrical system.

Calera will concentrate 1000 tons per day to ease cobalt shortage

Output kept continuous at new mine and mill by G-E engineered electrical layout

Soaring military demands for scarce cobalt—vital metal used in jet engines, armor plate, shells, and other weapons—will be met in 1953 with the help of the Calera Mining Company's new mine and mill at Cobalt, Idaho.

To keep the concentrator operating continuously, with fewest possible outages, this Howe Sound subsidiary turned to General Electric during the planning stage for help in engineering the electrical system. G-E application engineers designed—as a co-ordinated unit—the electrical layout for the mine, the mill, and the new town of Cobalt.

Thanks to the carefully planned flexibility of this electrical system, the Calera Company met government requests to increase the concentrator's capacity by 40 per cent without serious delay.

GENERAL ELECTRIC

TURN PAGE FOR PHOTO REPORT

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UNITED STATES STEEL

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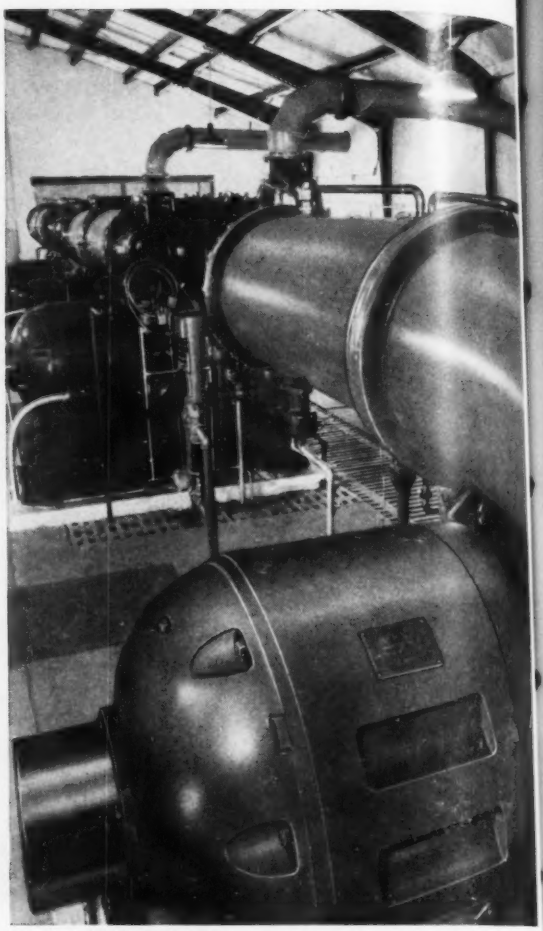
GENERAL ELECTRIC

TURN PAGE FOR PHOTO REPORT

1. ORE TRANSFERRED ON MINE LEVEL is handled by this 4-ton General Electric battery trammer.

2. DEPENDABLE VENTILATION—to clear the air after blasting in the mine—is provided by this 30-hp totally-enclosed G-E motor. It runs continuously when the mine is worked.



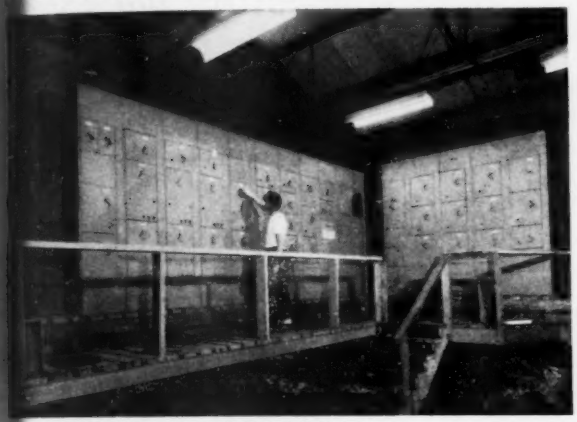
3. AIR COMPRESSORS are driven by 300-hp G-E motors. Compressor building also houses a standby diesel generator which supplies emergency power for surface plant facilities.

Major cobalt mine in U.S. relies

THIS 1000-TON CONCENTRATOR at Cobalt, Idaho, separates a copper, a cobalt, and an iron product. Crushing plant and concentrator are located close to mine portal. Treatment involves long conditioning of the pulp with lime at 80 to 90 degrees Fahrenheit.

PRIMARY AND SECONDARY CRUSHERS—driven by G-E Tri-Clad* motors—are supplied from a 480-volt wye-connected, solidly grounded G-E load-center unit substation.

*Registered trade-mark of General Electric Co.



5. CONTINUITY OF PRODUCTION is better assured by this General Electric motor control center. It contains small motor starters, feeders for crane, lighting and power circuits.

6. ORE IS PROCESSED in flotation cells, driven by G-E motors, then concentrates are shipped to the Howe Sound Company's new $2,500,000 cobalt refinery at Garfield, Utah.

on co-ordinated electrical system

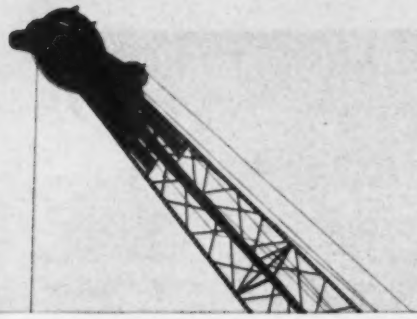
More than two years of pilot-plant testing—and the development of a novel technique of selective cobalt flotation—was needed before the new Calera mill started operating as the first major source of domestic cobalt.

To assure reliable power distribution and motor operation for the new installation, Howe Sound specified G-E equipment throughout. G-E application engineers, working closely with Howe Sound's engineers, designed a completely co-ordinated electrical system. Further, G-E service engineers were on hand for equipment start-up and during the "breaking-in" period. As an indication of their satisfaction with the electrical system, Howe Sound specified G-E equipment for their new $2,500,000 cobalt refinery at Garfield, Utah, just now going into operation.

Whatever your electrical needs—large or small, modernization or expansion—G-E application engineers can help you and your consultants. Contact your local G-E Apparatus Sales Office. General Electric Co., Schenectady 5, N. Y. 660-28

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC



Here's what they say in Nueces Bay:

5,600 hours...no repairs..."does a beautiful job"!

Alongside Nueces Bay near Corpus Christi, Texas, the Caterpillar D13000 which powers this Marion dragline has clocked 5,600 hours in five years—with *no repairs!* Owned by Halliburton Portland Cement Co., the 1¼-yard bucket handles 100 yards per hour in this clay pit. "It's been a very satisfactory engine," says dragline operator J. J. Turner, "and does a beautiful job with this machine."

Many mines have standardized on Caterpillar Diesel Engines for fast output and peak operator efficiency, for long-lived economy and minimum down time. All Cat* Diesels deliver full power, without fouling, on low-cost No. 2 furnace oil. Leading manufacturers can supply these engines in the mining machinery they build. There are 12 engine sizes to 500 HP, and electric sets to 315 KW.

Talk over your power needs with your Caterpillar Dealer, who will gladly show you on-the-job performance. See for yourself how these rugged, power-packed Diesels can mean more profit for you.

CATERPILLAR, San Leandro, Calif.; Peoria, Ill.

CATERPILLAR

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

CAPITOL CONCENTRATES

GOVERNMENT MAY TRANSFER MUNITIONS BOARD DUTIES

The controversial Munitions Board which establishes specifications for stockpile materials, and also determines from military and civilian supply and requirement figures what amounts the Emergency Procurement Service shall purchase, has been severely criticised for several years. Industry has thought the board's specifications for many materials are out of line with practicalities; civilian agencies, which are affected by supply, requirement and stockpile figures, have often felt a lack of accuracy and firmness in the Munitions Board's statistics; and the Congress has questioned the physical makeup of the stockpile. It has been all too common, for example, when Congressional inquiries turned up the fact that a certain item was stockpiled to the extent of say 50 percent of requirements to have a figure of 75 percent emerge a few days later. This did not mean that any more material was in the warehouse—merely that, for purposes of show, the requirement figure (which is secret) had been lowered to increase the percentage. The Munitions Board, composed principally of Armed Services brass hats, is now about to suffer from its misdeeds, according to administration sources. While set up by law, it is understood that Congress may be asked to approve a reorganization plan which would abolish it and transfer its functions to one of the civilian agencies.

• *Mine Dumps Are Not Eligible*

The Internal Revenue Bureau has reaffirmed its position that depletion will not be allowed on mine dumps or tailing piles.

• *Miners Knew It All The Time*

The Office of Public Information of the Defense Production Administration has issued a bulletin termed "Raw Materials Imports: Area of Growing Dependency." In this interesting document is a list of materials from antimony to zinc, showing the sources, percentage dependency upon foreign imports, strategic uses, and relative tightness of the supply-demand situation, of some 27 materials. Oddly enough, considering how poorly it has handled domestic mineral policies, DPA states that the bulletin illustrates "the effect on our industrial economy, were we to be cut off from our sources of supply" and shows how "serious and far-reaching" the problem is. This comment probably is the understatement of the decade, and not too well known to many of the government economists, policy makers and brass hats. The mining industry, on the other hand, has been singing this song, almost unheard, for many years.

• *Study of Land Withdrawals Requested*

A much-needed study of withdrawals of lands from the public domain has been requested from the Interior Department by Representative W. A. Dawson of Utah. There is little doubt but that both Congress and the public have lost sight of the original reasons for many of these withdrawals and Dawson, in his request to Secretary McKay, said, "Now is the time to review these actions and to know the reasons for them."

• *Transfer of Divisions Rumored*

The Foreign Division of DMPA was originally a part of ECA and all foreign mineral projects in which the government was interested were financed through ECA. One of the latest rumors about DMPA is that the foreign division may be turned over to the Mutual Security Agency (which absorbed ECA) and that the domestic section may be absorbed by GSA.

• *Need For Scrap Forced Ceiling Removal*

Well, it seems we were wrong in our prediction that OPS would hold to primary copper price ceilings until the last ditch. The story had been verified by a highly placed, "authorized" leak in OPS, but you never can tell.

What actually happened was that copper scrap did not start to flow into the market in spite of the removal of ceilings and the fabricators were getting into a desperate position. The premature (from the OPS viewpoint) removal of the 24.5-cent ceiling was due to the extreme pressure created by the scrap situation.

• *Stand-by Controls May Be Authorized*

It looks very much as though the President would approve a bill giving him 90-day stand-by controls, to be invoked in case of emergency. This would give Congress time to pass a new control and stabilization act in case of war.

• *Chilean President Denies Rumors*

The press is full of statements by Chilean President Ibanez denying the rumors that the copper mines of Chile will be nationalized. Ibanez not only has the Bolivian fiasco as a dire example of this sort of stupidity, but he knows very well that such an action would stop the immense flow of United States capital which has made these mines prosperous and successful, and would cause the loss of the technical help which is essential to economical operations. Further, he knows that if the mines were expropriated there would be little point in paying Chile a profit of around $200,000,000 a year for the privilege of operating them.

• *Tariff Policy Trend Is Indicated*

The "briar pipe" case, which has been looked upon as an indication of the President's future tariff policy, was decided by a refusal to boost the tariff. The feeling is that, in spite of historically being the high-tariff party, the Republicans definitely are turning to a policy of low tariff and world trade without barriers.

• *Liquidation of RFC Will Be Pushed*

There is a concerted move in Congress to kill off the RFC and send it to the Treasury Department for liquidation. At one time, when the law permitted, the RFC was a great help to the domestic mining industry. This has not been true since the act was revised by the 80th Congress and its mine loan authority destroyed. At the same time, RFC probably is the only agency which quite consistently makes money and actually contributes to the Treasury.

PROMPT DELIVERY

Low Reagent Inventory at your mill

Western mills benefit doubly by Cyanamid's Complete Metallurgical Chemical Service on metallic and non-metallic minerals.

We offer a wide choice of reagents for many beneficiation needs with savings on inventory carrying-charges through combination shipments from nearby warehouse stocks. We offer also the practical help of Cyanamid Field Engineers and the Cyanamid Mineral Dressing Laboratory in the selection and application of the most efficient reagent combination for your ore under your mill conditions.

Orders for Cyanide, Flotation Reagents and other Metallurgical Chemicals may be placed with American Cyanamid Company, Azusa, California; El Paso, Texas; or c/o Weicker Transfer & Storage Co., Denver, Colorado.

AMERICAN
Cyanamid
COMPANY
MINERAL DRESSING DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

Transfer of Mineral Rights Asked

Senator Hunt of Wyoming has introduced S. 80[illegible], a bill which would grant to the states all mineral rights under lying public lands. In his speech he made a strong plea of the now-famous tidelands case to support his contention that these rights should be administered by the states rather than the federal government. No doubt anticipating state leasing of these rights, Senator Hunt said: "If these mineral rights are given to my state income from them would make Wyoming self-supporting to a far greater extent, and thus lessen, if not entirely eliminate, a need for grants-in-aid programs."

The bill does not provide for the transfer of surface rights to the states, which might cause considerable confusion and conflict in administration.

Forbes Replaces Jess Larson

The GSA, since Jess Larson's resignation, has been headed by Russell Forbes, formerly Larson's deputy. Acting Administrator Forbes has delegated to Howard I. Young all his DMPA authority.

Possibilities Should Be Studied

The Senate Small Business Committee had voted to sponsor continuation of the Small Defense Plants Administration until June 30, 1954. Theoretically, this agency is in a position to certify to RFC mining defense projects, but so far this possibility does not seem to have been explored by the mining industry.

Funds For Access Roads Are Cut

The congressional economy drive is striking hard at the mines access road program. The Bureau of Public Roads asked for $8,000,000 to complete present contracts and $15,000,000 for new roads, some 13 of which already have the approval of DMPA. The second supplemental appropriation bill thus contained $23,000,000 for access roads. The Secretary of Commerce withdrew the $15,000,000 of new authorization and the bill passed the House in that form, allowing only the $8,000,000. There will be a determined effort in the Senate to restore at least a part of the funds cut out of the House bill. This access roads program is anything but boon-doggling. It is a very important part of the nation's raw materials development program. There must be less vital places to economize than to hinder the development and production of our minerals and metals.

• *Suspension Of Duty On Aluminum Asked*

Following the duty suspension moves on copper, the aluminum industry wants to get in on the act. Representative Emanuel Celler of New York has introduced H. R. 403 to provide for tariff-free importation of aluminum until March 31, 1954, or until the termination of the national emergency, whichever date comes first.

COMING CONVENTIONS

April 9, 10, and 11, 1953. LEAD INDUSTRIES ASSOCIATION. Silver Anniversary convention, Greenbrier, White Sulphur Springs, West Virginia.

April 27, 28, 1953. Annual meeting AMERICAN ZINC INSTITUTE, INC., Hotel Statler, St. Louis, Missouri.

April and May 1953. FIFTH EMPIRE MINING AND METALLURGICAL CONGRESS. Opening session at Melbourne, Australia April 20, followed by extensive tours.

July 13 to 16, 1953. Fiftieth anniversary meeting IDAHO MINING ASSOCIATION, Sun Valley, Idaho.

INTERNATIONAL PANORAMA

JAMAICA, B.W.I.—Kaiser Aluminum and Chemical Corporation's new $12,000,000 bauxite mining operation has been formally opened. The first 10,000-ton shipment has been made to Kaiser's plant at Baton Rouge, Louisiana.

SAN FRANCISCO—Imports of lead in 1952 set an all-time high of 637,307 short tons, compared to 266,886 in 1951. Copper imports were up to 439,560 short tons, compared to 350,282. Zinc imports were also up—504,067 compared to 351,421.

BELGRADE—The International Bank For Reconstruction and Development has loaned $30,000,000 to Yugoslavia. The funds will be used to increase iron ore production by 900,000 annual tons, alumina by 60,000 tons, and aluminum by 15,000.

WASHINGTON—Strategic and critical materials in the United States stockpile were valued at $4,024,622,630 at the end of 1952. For minerals, the stockpile goal has been met for antimony, bismuth, fluorspar, and iridium.

STEEP ROCK, ONTARIO—Inland Steel Company's subsidiary, Caland Ore Company, Limited, plans to spend $50,000,000 to develop its 1,200 acres of leased iron land here. Production of 3,000,000 tons of high-grade ore per year is planned.

WASHINGTON—The United States government has made a profit of $833,600,000 on silver purchases under the Silver Purchase Act of 1934.

OTTAWA—Kerr-Addison Gold Mines Limited, Canada's largest gold producer, set a new production record in 1952 for tons ore mined, ounces gold produced, and value of production. Daily mill rate averaged 4,508 tons and gold production was valued at $12,566,611.

GLOBE, ARIZONA—Miami Copper Company will spend $3,000,000 to mine and recover 230,000,000 pounds of copper under a contract with the DMPA. A low-grade deposit containing only 0.5 percent copper near the present mine will be developed. A floor price of 27.35 cents per pound has been set for the copper by DMPA.

CONAKRY, FRENCH GUINEA—First shipment of iron ore has been made to Belgium by the Compagnie Miniere de Conakry. Production is scheduled for 100,000 tons per month.

BANGOR, MAINE—Research in treatment methods to economically recover manganese from Aroostook County deposits has been authorized by DMPA. Southwestern Engineering Company is doing the work under en earlier contract.

REPUBLIC, MICHIGAN—Cleveland-Cliffs Iron Company will build a two unit flotation plant here to produce 400,000 annual tons of concentrate from low iron content jasper. First production is scheduled for mid-1955.

BOMBAY—A concentrating plant is to be built 25 miles from here to up-grade ilmenite to a 55 percent TiO_2 content for export.

HIBBING—Youngstown Sheet and Tube Company has sold the Steel Company of Canada, Ltd. 10 percent interest in Erie Mining Company which is planning a multi-million dollar taconite plant on the eastern Mesabi Range.

DJAKARTA—The tin mines of the N. V. Gemeenschappelijike Mijnmouw Maatschappij and Billiton Company on the island of Banka have been formally transferred to the Indonesian government.

WASHINGTON—The Office of Defense Mobilization reports that 27 percent of the $811,922,000 worth of iron ore expansion facilities given tax aid were complete at the end of 1952.

GRAND JUNCTION, COLORADO—Colorado Plateau uranium miners have been paid $1,459,126 in bonuses for initial production of uranium since the start of the bonus program on March 1, 1952. Payments are paid to new mines and those having produced less than 10,000 pounds of U_3O_8.

SAN FRANCISCO—California was the only major iron ore producing state to yield more iron ore in 1952 than in 1951 in spite of the steel strike. California output increased to 1,400,000 gross tons from 1,198,847.

KELLOGG, IDAHO—Gibbonsville Mining and Exploration Company backed by a DMPA guaranteed floor price on zinc has started its 400-ton-per-day flotation plant treating old tailings in the Coeur d'Alene River.

LONDON—The British Ministry of Materials has finished liquidating its disposable stock of lead. Selling of this lead which started last October has driven the world price for lead down to 13.5 cents per pound, New York.

WASHINGTON—Ceiling prices on the last three controlled metals—nickel, chromium, and beryllium—are scheduled to end on April 30th.

MONTERREY, MEXICO—American Metal Company, Ltd. has closed one of its lead blast furnaces here. Production will be cut by 700 tons of lead monthly.

CLEVELAND—The United States Steel Corporation is building the world's largest iron blast furnace here. It will produce 1,350 tons of pig iron per day.

LISBON—The Portuguese Ministry of Economy has announced that the government plans to establish a steel plant to use Portuguese iron ores.

SINGAPORE—Malayan production of tin in February has been announced as 4,943 long tons.

WASHINGTON—The International Materials Conference ended all free-world allocations of sulphur on March 1.

PALMERTON, PENNSYLVANIA—The New Jersey Zinc Company of Pennsylvania has received accelerated amortization certificate for 45 percent of the cost of a $15,000,000 titanium dioxide plant.

WASHINGTON—DMPA has amended its manganese ore purchasing program to include iron furnace slags. High alumina-silica content will be penalized.

End of Copper Ceilings Voids Six DMPA Contracts

Following removal of the United States price ceiling on copper on February 25th, Kennecott Copper Corporation raised its price for copper to 27.5 cents per pound, Phelps Dodge Corporation to 28.5 cents, and Anaconda Copper Mining Company to 32.0 cents. The immediate effect of these initial copper price increases was that six domestic mining companies having DMPA floor price contracts had these contracts automatically terminated because all contracts contained a clause terminating the agreement upon removal of copper price ceilings.

Those companies affected were the Howe Sound Company which had a contract for delivery of 8,834,000 pounds of copper at 4.7 cents per pound over controlled price from its Holden mine in Chelan County, Washington; Yucca Mining and Milling Company, Inc., covering a contract to sell 5,025,000 pounds of copper from its Antler mine, Mohave County, Arizona; Sam Mining Lease, Inc., for a 2,390,000-pound contract at 31.6 cents per pound from the Christmas mine, Gila County, Arizona; Banner Mining Company, for 5,400,000 pounds from its Misers Chest mine at Lordsburg, New Mexico; Copper Range Company, 6,372,000 pounds at 33.8 cents per pound from Champion mine, Houghton County, Michigan; and Calumet and Hecla, Inc., 35,000 short tons of copper at 25.25 cents from the Osceola mine, and for production from the Iroquois, No. 4 Kearsage, and Peninsula mines under floor prices of 30.5 cents, 31.0, and 29.6, respectively.

International Bank Aids Yugoslavia In Expansion

The International Bank for Reconstruction and Development will loan Yugoslavia the equivalent of $30,000,000 in 10 European currencies to help finance completion of key projects in seven major sectors of the country's economy. This is expected to bring about substantial increases in industrial production, thereby improving the country's foreign trade position.

The money will pay for the importation of needed equipment for electric power generation and distribution; coal mining; extraction and processing of non-ferrous metals; iron and steel production; other manufacturing industries; forestry; and transportation.

Production capacity is expected to be increased as follows: iron ore by 900,000 tons annually; pig iron by 260,000 tons; steel ingots by 275,000 tons; and finished steel products by 195,000 tons. New processing plants will raise alumina production by 60,000 tons and aluminum output by 15,000 tons. Increased coal production and electric power, along with improvements in transportation, will aid other industries in their expansion programs.

VAN STONE

American Smelting's Newest Zinc Operation

DESIGN FEATURES OF MILL

Labor Saving Devices

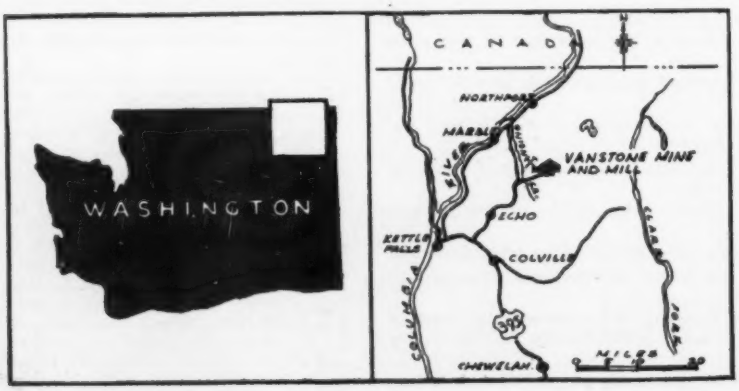
"Dribble chute" under primary
spills.
Truck delivery and centralized
Automatic lubrication of jaw cr
Mechanical concentrate loading
of trucks into railroad gondo

Efficient Low-Cost Operation

Good and uniform lighting.
Adequate room around all equi
control and repairing.
Every piece of major equipmen
head crane.
Duplicate pumps assure contin
being repaired, alternate is
Centralizing of all pumps on c
tion.
Mill spillage and floor washi
sump for return to zinc conc

Process Control

Uniformity of ball mill water
head tank facilitates pulp c
Three kinds of flotation cells
purpose.
Pilot tables show undesired i
flotation can be made.
Pilot table for final tailing pe
operating efficiency.
Uniformity of illumination in
fluorescent lighting as this s
Series conditioning of pulp be
Regrinding of zinc flotation mi
Automatic sampling of ball mill feed, classifier overflow, lead concentrate, zinc concentrate, and tailing insures an easy and rapid check on metallurgy.



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Of great significance to the world and to the national defense program is the new Northport Unit of the American Smelting and Refining Company which has been put in operation in Stevens County, Washington.

The project is important for many reasons:

1. The smelting-mining company is operating its first major open-pit mine in the United States.

2. The Van Stone is the newest

retired on January 1, 1953; and Norman Weiss, milling engineer.

Operational personnel at the mine are P. A. Lewis, general superintendent; Robert A. Blake, mill superintendent; R. Kenneth McCallum, assistant mill superintendent; Lyle Hallberg, metallurgist; Wilson Tooke, assayer; Frank Paparich, open pit foreman; Ralph Stuve, engineer; George Moad, chief clerk; and Fred Harding, assistant clerk.

Recent Discovery

The Van Stone orebody was discovered by George Van Stone of Northport, Washington while deer hunting in the early 1920's. An old-time prospector, he noticed high-grade lead float along a branch of Onion Creek and eventually su-

pit mine to the 1,000 ton flotation mill.

HTLY

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ore- turns. As the ore plunges into the

Republic, Washington, Black Rock zinc mine at nearby Northport, acquired 14 claims from J. S. Brown, who had leased them from George Van Stone and H. Mayloy. Willow Creek made a geological examination, followed by diamond drilling, but did not produce any ore.

In mid-1950, ASARCO acquired the Van Stone claims, as well as several adjoining properties, and commenced a geologic survey and diamond drilling program. Four diamond drills were kept busy during the winter of 1950-1951 drilling on a regular grid with lines spaced at 100-foot intervals across the strike of the orebody. Individual holes along each grid line were varied in accordance with drilling results.

rintendent, has been in charge of the operation from the first diamond drilling. RIGHT: Robert A. Blake, mill superintendent (left), has a wide experience in treating western ores from Colorado to Washington, and R. Kenneth McCallum, assistant mill superintendent, whose flotation experience in treating low-grade zinc ores serves him well at the Van Stone.

VAN STONE

American Smelting's Newest Zinc Operation

DESIGN FEATURES OF MILL

Labor Saving Devices

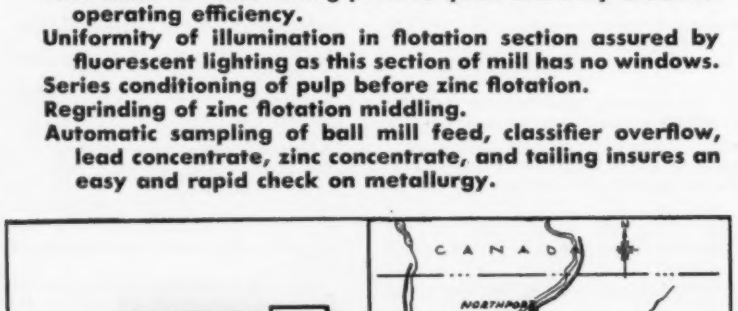
"Dribble chute" under primary feeder reduces clean-up of spills.
Truck delivery and centralized mixing of all reagents.
Automatic lubrication of jaw crusher and cone crusher.
Mechanical concentrate loading into truck and self unloading of trucks into railroad gondolas.

Efficient Low-Cost Operation

Good and uniform lighting.
Adequate room around all equipment facilitates operational control and repairing.
Every piece of major equipment can be serviced by an overhead crane.
Duplicate pumps assure continuous operation: when one is being repaired, alternate is in operation.
Centralizing of all pumps on one floor below flotation section.
Mill spillage and floor washings gravity flow to clean-up sump for return to zinc conditioner.

Process Control

Uniformity of ball mill water feed by means of a constant head tank facilitates pulp density control.
Three kinds of flotation cells are used, each for a specific purpose.
Pilot tables show undesired iron so that quick changes in flotation can be made.
Pilot table for final tailing permits quick and easy check on operating efficiency.
Uniformity of illumination in flotation section assured by fluorescent lighting as this section of mill has no windows.
Series conditioning of pulp before zinc flotation.
Regrinding of zinc flotation middling.
Automatic sampling of ball mill feed, classifier overflow, lead concentrate, zinc concentrate, and tailing insures an easy and rapid check on metallurgy.



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The project is important for many reasons:

1. The smelting-mining company is operating its first major open-pit mine in the United States.

2. The Van Stone is the newest of the small, but growing number of open-pit zinc mines in North America.

3. The 1,000-ton-per day, differential flotation mill has been engineered for optimum recovery of 4.0 percent zinc, and less than 1 percent lead in the ore, at low cost. Every piece of equipment in the mill was carefully selected to perform a specific function in the circuit.

4. In shortly over a year's time 750,000 tons of waste have been stripped off the orebody, 30,000 tons of ore mined and stockpiled, and the mill and auxiliary buildings constructed and mill placed in operation.

The Van Stone mine and advanced-design mill are the successful culmination of the ASARCO staff's engineering know-how and inter-departmental cooperation. D. J. Pope, general manager of the Western Mining Department, coordinated activities of the exploration, mining and milling departments. These individual departments were headed by Keith Whiting, exploration engineer; J. Fred Johnson, former manager of Western Operations who retired on January 1, 1953; and Norman Weiss, milling engineer.

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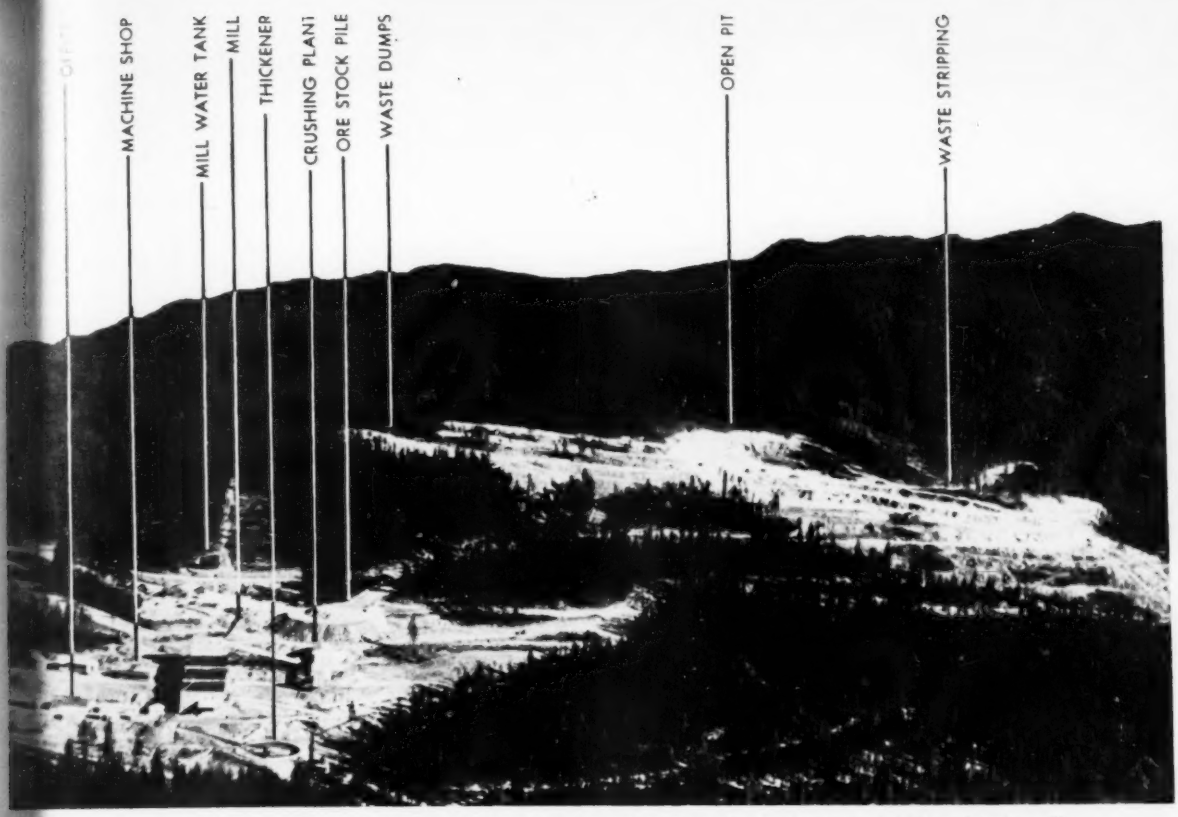


This panoramic picture shows the far-flung Van Stone operations from the open pit mine to the 1,000 ton flotation mill.

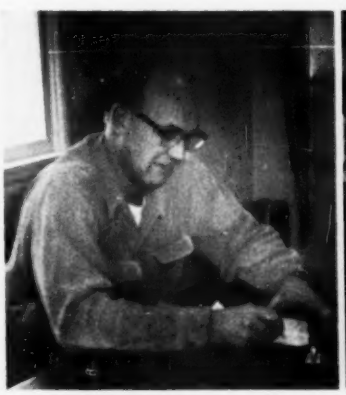
ceeded in tracing it to its source on the hillside above. The ore cropped out only in one place and was a few 10's of square feet in area. He attempted to develop the deposit on a small scale and succeded in making a few shipments of sorted lead ore, which proved to be high in zinc, deterring additional work.

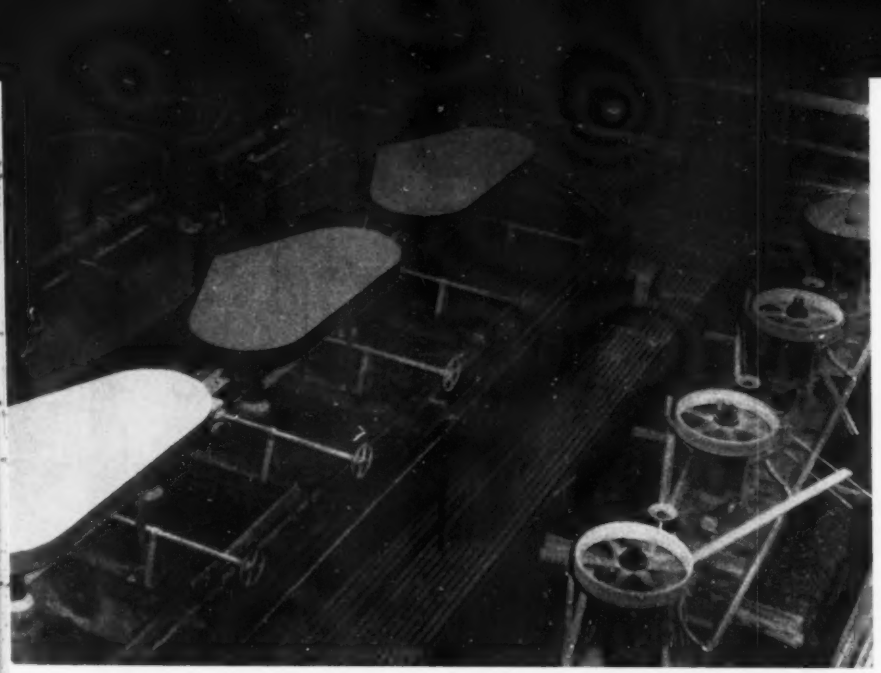
In the late 1920's a short adit was driven. Low metal prices and the depression forced cessation of this work. In mid-1943, Willow Creek Mines Inc., which at that time was operating the Knob Hill gold mine at Republic, Washington, and the Black Rock zinc mine at nearby Northport, acquired 14 claims from J. R. Brown, who had leased them from George Van Stone and H. Maylor. Willow Creek made a geological examination, followed by diamond drilling, but did not produce any ore.

In mid-1950, ASARCO acquired the Van Stone claims, as well as several adjoining properties, and commenced a geologic survey and diamond drilling program. Four diamond drills were kept busy during the winter of 1950-1951 drilling on a regular grid with lines spaced at 100-foot intervals across the strike of the orebody. Individual holes along each grid line were varied in accordance with drilling results. Where orebody uniformity extended from grid to grid, the holes in a line were more widely spaced. Where drilling disclosed irregularities, the holes were spaced closer together to obtain more detailed information. A total of 74 holes were drilled. These were angle holes drilled from the surface normal to the steeply dipping orebody.

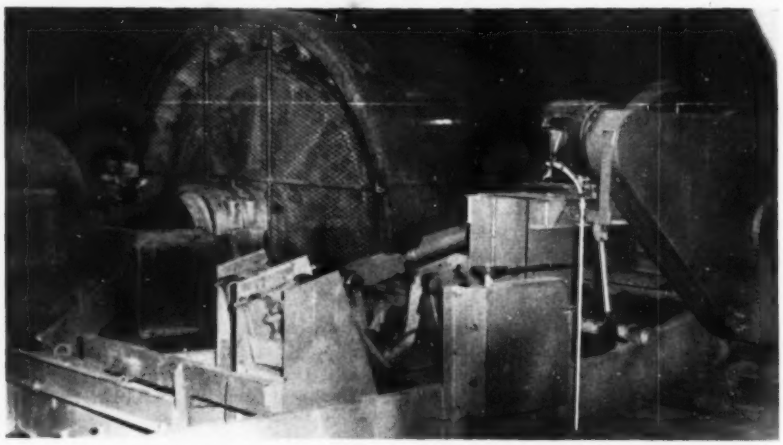
This work disclosed two mineralized deposits occurring as replacements in the 70° northerly dipping Metaline limestone. The north orebody was oxidized to a depth of only a few feet and is now being mined. It is a large lens up to 140 feet in width, following the curving bedding along the strike of the limestone, which, in turn, closely parallels the turning granite contact about 500 feet north of the orebody. The southern end of the north orebody has a N.45° E. strike, but on the north it "button hooks" to the east, into the hillside. The orebody and the inclosing beds steepen as the orebody turns. As the ore plunges into the

LEFT: P. A. Lewis, Northport Unit superintendent, has been in charge of the operation from the first diamond drilling. RIGHT: Robert A. Blake, mill superintendent (left), has a wide experience in treating western ores from Colorado to Washington, and R. Kenneth McCallum, assistant mill superintendent, whose flotation experience in treating low-grade zinc ores serves him well at the Van Stone.





Three separate types of flotation machines are a feature of the mill. From left to right they are: No. 48 Agitairs producing a rougher lead concentrate; No. 24 Denver "Sub-A" cells making a high-grade zinc concentrate; and No. 66 Fagergren cells making a rougher zinc concentrate.



One of the two identical Marcy ball mill Dorr rake classifier grinding circuits in the mill. The Marcy is a No. 77 grate discharge mill and the classifier is a DSFX rake type.

hill, it "horsetails" [illegible] in a series stringers. The ore body is cut [illegible] series of irregular post-ore dikes which will be selectively mined as waste during open pit ting. Another series of steeply dipping amphibole dikes near the ore body were found by drilling.

The two small uppermost benches have now been mined and ore grade has checked closely with that predicted from drilling results.

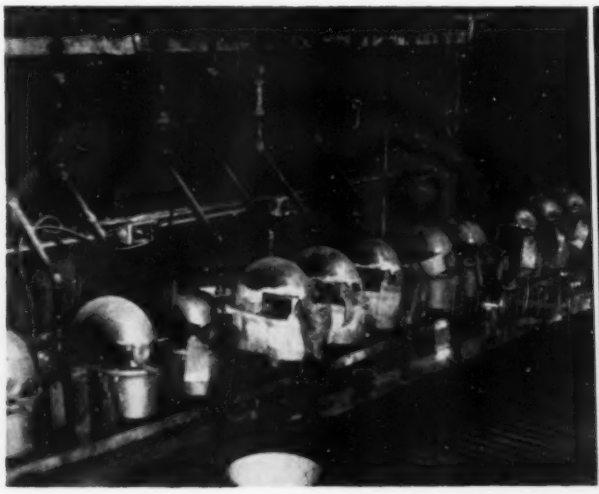
Open Pit Planned

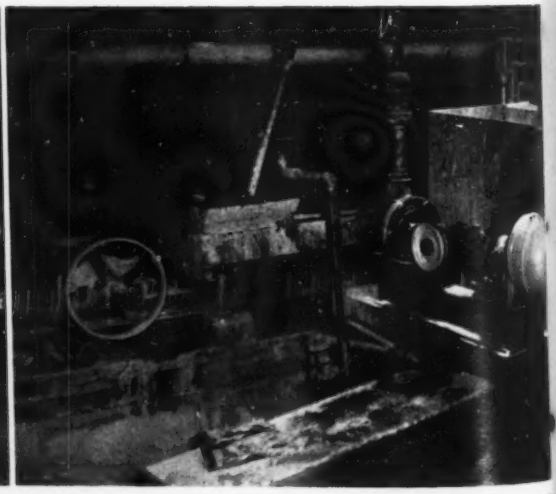
With data supplied by the geologic department, the mining department developed plans for open pit mining. The pit will have an ultimate length of 1,400 feet, will have a maximum width of 400 feet, and will be 300 feet deep on the eastern hill side. The bottom of the pit will be 50 feet below the mill grade level so that only a small tonnage will have to be trucked uphill to milling. The top of the first bench stripped was at an elevation of 3,[illegible] feet above sea level, and the top of the ore was at 3,785 feet. The lowermost bench will be at 3,550 feet, and it is anticipated that complete extraction of ore will require underground mining at some future time. Stripping ratio will be about 1.3 tons of ore to 1.0 ton of open-pit ore. The benches will be 25 feet high; every second bench on the east or big hillside will have a flat berm [illegible] feet wide before the next bench drops off. This results in an overall 50° bank slope with individual bench slopes of 60°.

Isbell Contracts Mining

The Isbell Construction Company of Reno, Nevada was awarded the

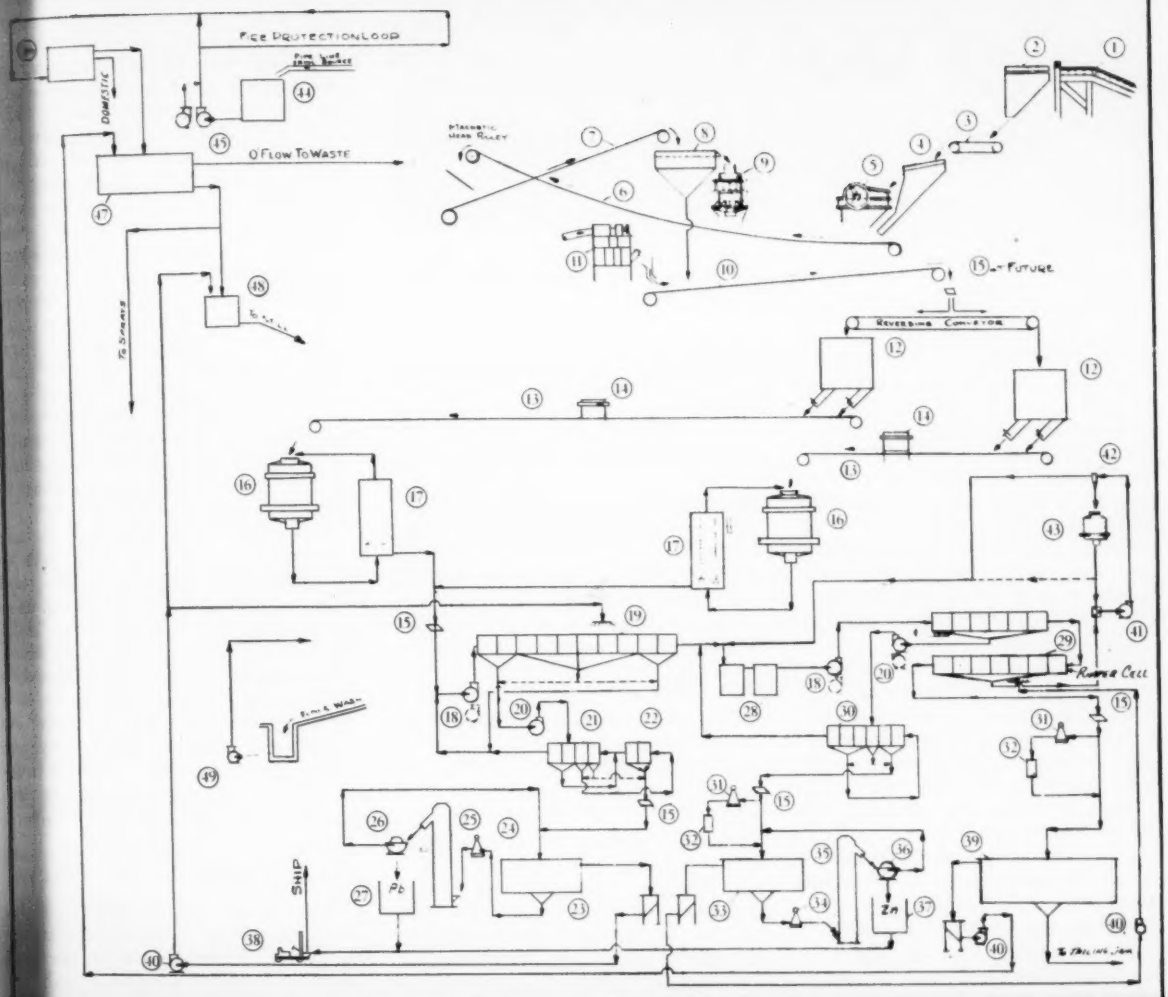
LEFT: Reagent control is an easy task at these 13 Clarkson reagent feeders centralized at the head of the flotation floor. RIGHT: This Denver pump (right) and Wilfley laboratory table take a continuous sample of zinc tailing as a continuous guide to flotation efficiency. The operator makes a regular inspection for zinc on the table.





FLOWSHEET OF ASARCO's 1,000 TON VAN STONE DIFFERENTIAL ZINC-LEAD FLOTATION MILL

Northport, Washington



LEGEND

CRUSHING PLANT

1. Truck ramp.
2. Ore bin with 24-inch grizzly.
3. 18-inch Telsmith feeder (Reeves variable-speed drive).
4. 42-inch by 8-foot inclined bar grizzly, 3½-inch openings.
5. 36- by 42-inch jaw crusher, 3-inch minimum opening.
6. No. 1 belt conveyor, 30 inches.
7. No. 2 belt conveyor, 30 inches.
8. 5- by 11-foot Allis-Chalmers Repl-Flo rod deck screen, ½-inch openings.
9. 5½-foot Symons shorthead cone crusher.
10. No. 3 conveyor belt, 24 inches.
11. Dust collection system.

GRINDING—CLASSIFICATION

12. 800-ton cylindrical steel fine ore bins.
13. 20-inch belt feeders.
14. Fairbanks-Morse Conveyor scales.
15. Geary-Jennings automatic sampler.
16. Marcy No. 37 grate discharge ball mills.
17. Dorr DSFX rake classifiers.
18. 4-inch Hydroseal pump and spare.

LEAD FLOTATION

19. No. 48 Agitair flotation cells.
20. Two disc, 6-foot Eimco filter.
21. No. 18 Denver "Sub-A" cleaner cells.
22. No. 15 Denver "Sub-A" recleaner cells.

LEAD CONCENTRATE THICKENING AND FILTERING

23. 18- by 8-foot Dorr thickener.
24. Denver Diaphragm pump.
25. Bucket elevator.
26. Twi disc, 6-foot Eimco filter.
27. Lead concentrate storage bin.

ZINC FLOTATION

28. Wemco 8- by 8-foot conditioners.
29. No. 66 Fagergren cells.
30. Marcy No. 47 ball mill.
31. Two, 3-inch Dorrclones.
32. Sand pump.
33. No. 24 Denver "Sub-A" recleaner cells.
34. Denver diaphragm pump.
35. Willfey pilot table.

ZINC CONCENTRATE THICKENING AND FILTERING

33. 30- by 10-foot Dorr thickener.
34. Denver diaphragm pump.
35. Bucket elevator.
36. Five disc, 6-foot Eimco filter.
37. Zinc concentrate storage bin.

AUXILIARY EQUIPMENT

38. Hough Payloader.
39. 50-foot Dorr thickener.
40. Return water pump.
41. 20,000-gallon water tank.
42. Water pumps, 300 gallons per minute.
43. 40,000-gallon fire protection tank.
44. 200,000-gallon mill storage tank.
45. 6,000-gallon steady head tank.
46. Floor wash and cleanup sand pump.

Isbell Construction Company of Reno, Nevada, contracts open pit work. Ore and waste are loaded in the open pit with this Northwest, 2½-yard, 80B Diesel Shovel. Model F. Euclid Diesel trucks are used for hauling.

stripping and mining contract. One of the first jobs done by Isbell was the improving of old roads and building of a new road to the mine from Onion Creek.

Following road completion, Isbell started stripping and mined and stockpiled the first ore in June 1952.

Isbell's construction supervisory crew are Gery Newton, superintendent; Gus Jeepson, pit foreman; Jack Good, drill foreman; and Al Bryer, engineer.

Ore will be delivered to a hopper, equipped with a 24-inch grizzly, at the mill, so Isbell has standardized on drilling small diameter holes on close centers. Gardner-Denver wagon drills are used in the pit to drill 20-foot-deep holes 2½ inches in diameter. In ore, holes are spaced on four-foot centers; in waste, greater spacing is used. Holes are loaded with 2- by 12-inch sticks of 60 percent Atlas and DuPont powder, and fired by electric millisecond caps. Initial use of shaped charges for secondary blasting of boulders segregated by the shovel has been successful. The powder cost is higher than for block holing, but this is more than offset by the ease and speed of placing shaped charges in contrast to the difficulties in drilling each boulder. Shaped-charge blasting also minimizes fly rock, permitting secondary blasting without moving the shovel out of the pit.

Ore and waste are loaded by one Northwest, 2½-yard, model 80B. Diesel shovel into three, Model F 9.8-yard-capacity, end dump, Euclid Diesel trucks. ASARCO's pit foreman checks loading operations at the shovel bank and directs the shovel operator to load either ore or waste. This assures close control, particularly in low-grade areas around the orebody periphery. Waste is trucked from the pit limits to any of a series of side hill waste dumps, and ore is trucked over the ¼-mile-long, down hill road to the grizzly. A Caterpillar D8 with bulldozer is used for road building, pit cleanup, and snow removal. Roads are maintained by a Caterpillar Auto Patrol.

Mill Below Pit

The mill was built on the hillside north of the open pit and so located that nearly all ore would be trucked over a load-favoring grade. The mill is close to the pit but far enough away that blasting is not dangerous and room for mine waste is available. The crushing plant is housed in a separate building from the mill proper. An inclined metal-covered conveyor belt gallery interconnects the two buildings.

Mill Design and Construction

The Western-Knapp Engineering Company of San Francisco, California was awarded the mill, crushing plant, and auxiliary building design and construction contract. ASARCO's milling engineer, assisted by the F. C. Torkelson Company of Salt Lake City, outlined the flowsheet, selected key machinery components, and supervised the project, leaving detailed working drawings and physical construction to WKE's staff.

Actual mill construction started Sept. 1, 1951, and the mill was ready for start-up test on October 8, 1952. Mill construction was continued through the winter of 1951-1952 in spite of a 110-inch snowfall and below-zero weather. Concrete was poured all winter by thawing fine, using heated aggregates and mixing water, and employing canvas covers and oil heaters. Steel erection was carried on simultaneously.

The mill building has a structural steel framework with siding of 1-inch lumber sheathing covered with building paper and corrugated iron sheeting and Johns-Manville built-up roof. An oil-fired boiler and unit space heaters warm the building even the coldest weather.

The mill is built with two truck-size drive-in doors on each side to facilitate delivery of reagents and other supplies. A labor-saving system is used for ball handling. Balls are trucked to the grizzly feeder, dumped into a chute, and dropped into ball storage located underneath the mill between the two fine ore bins. When balls make up balls are needed, they are dumped into a special receiving hopper which channels them into the mill through a short length of 4-inch pipe.

Crushing Plant

The primary and secondary crushers are set in a separate crushing building 250 feet south of the mill proper. Crusher servicing and

Flotation Reagents as to Type, Amount used per ton of Ore Treated, Point Addition, and Purposes at Van Stone Mill

Reagent	Pounds Per Ton of Ore	Where added	Purpose
	LEAD CIRCUIT		
Soda Ash	0.7	Ball mill	pH control
Sodium cyanide	0.15	Classifier overflow	Pyrite depressor
Dowfroth No. 250	0.03	Classifier overflow	Frother
Z-11 xanthate	0.12	Classifier overflow	Lead collector
Solution of starch and caustic soda	0.02	Lead cleaner cells	Amphibole depressor
	ZINC CIRCUIT		
Z-11 xanthate	0.12	Zinc conditioner	Zinc collector
Copper sulphate	0.60	Zinc conditioner	Zinc promoter
Lime	1.20	Zinc cleaner	pH control and pyrite depressor
Carbinal	0.10	Zinc conditioner	Frother

parts are facilitated by a 10-ton overhead traveling crane.

Ore is drawn from the bottom of the primary bin by a 48-inch Telsmith apron feeder. Rate of speed, and hence rate of draw, is controlled by a Reeves variable-speed drive. The feeder discharges onto an inclined 42-inch by 8-foot bar grizzly with 3½-inch openings. Undersize drops to the No. 1 conveyor belt, and oversize falls into a 36- by 42-inch Traylor jaw crusher with concave jaw plates. The open setting of the crusher is 4⅛ inches and the closed setting 3 inches. Crusher discharge also drops upon the No. 1 conveyor.

The crusher is greased automatically at regular pre-determined intervals by a Farval centralized lubrication system.

An aid in keeping this plant tidy is the "dribble chute" which is a steeply dipping concrete funnel built into the foundation under the apron feeder to catch spillage and deposit it on the No. 1 conveyor belt.

Transfer Tower Gains Height

The 30-inch, No. 1 inclined conveyor extends north from the crusher building to the transfer tower. The belt is equipped with a magnetic head pulley to remove tramp iron from the ore stream, grizzly undersize, and jaw crusher discharge.

In the tower, the ore drops to the No. 2 conveyor (30-inch), which is parallel to No. 1 and operates in the reverse direction. The tower and reversing of ore travel direction permit a gain of maximum height and a return of ore to the top of the crusher building in a short horizontal distance.

Secondary Crushing

The No. 2 belt enters the top of the crusher building and discharges its load to a 5-foot by 11-foot 7-inch Allis-Chalmers Repl-Flo rod deck vibrating screen with ½-inch opening. Screen undersize drops to the No. 3 conveyor belt and oversize feeds a 5½-foot Symons shorthead crusher driven by a 200-hp. Allis-Chalmers electric motor.

The Symons crusher discharge drops to the No. 1 conveyor and returns to the screen. The screen undersize is chuted to the No. 3 conveyor, thence to the fine ore bins. Either of the two 800-ton fine ore bins (cylindrical steel tanks) can be filled by reversing the direction of the horizontal distribution conveyor (No. 3-A) on top of the bins.

Equipment Protection

The entire crushing plant is electrically controlled with interlocking sequential starting and stopping of all equipment. If, for any reason, the oil pressure in the Symons lubrication system drops, or the Farval greasing system for the Traylor jaw crusher fails, a warning horn is triggered off. If the pressure is not back to normal in 30 seconds, the pan feeder is stopped by electrical interlock. In the event that the crushing plant is overloaded and the heavy ore load slows the No. 1 conveyor to 70 percent of normal speed, current to the pan feeder motor is shut off so that no additional ore can enter the jaw crusher. As soon as the surge of ore is through the plant and the No. 1 belt has picked up its normal speed, the feeder may be started.

Wagon drills are used to drill 20 foot deep holes on a four-foot center pattern in ore. Greater spacing is used in waste.

Grinding-Classification

The ore is classed as "medium hard to grind." Liberation of ore minerals is achieved when grinding to 55 percent minus-200-mesh. Ball mills were started with a prepared ball charge using 1, 1½, 2, 2½, and 3-inch diameter balls to assure efficient grinding from the start. Regular make up ball mill charge is 3-inch balls.

Grinding and classification is done on the uppermost mill floor by two identical side-by-side units. Each fine ore bin has two feeders to a 20-inch-wide conveyor belt which carries the load over Fairbanks-Morse conveyor scales before feeding the ball mill. Milling rate can be varied by controlling either or both of the bin feeders and by changing the belt speed through its Reeves vari-speed drive. Geary-Jennings automatic sampler can be added, if later required, to cut a sample from the ball mill feed which comprises the mill head sample.

Two Marcy No. 77 grate-discharge ball mills driven at 22.5 revolutions per minute by 250-hp. Allis-Chalmers synchronous electric motors are used for grinding. The mills reach full speed five seconds after the relay-controlled starter is actuated. Each ball mill operates in closed circuit with a 5-foot by 25-foot 6-inch Dorr DSFX rake classifier.

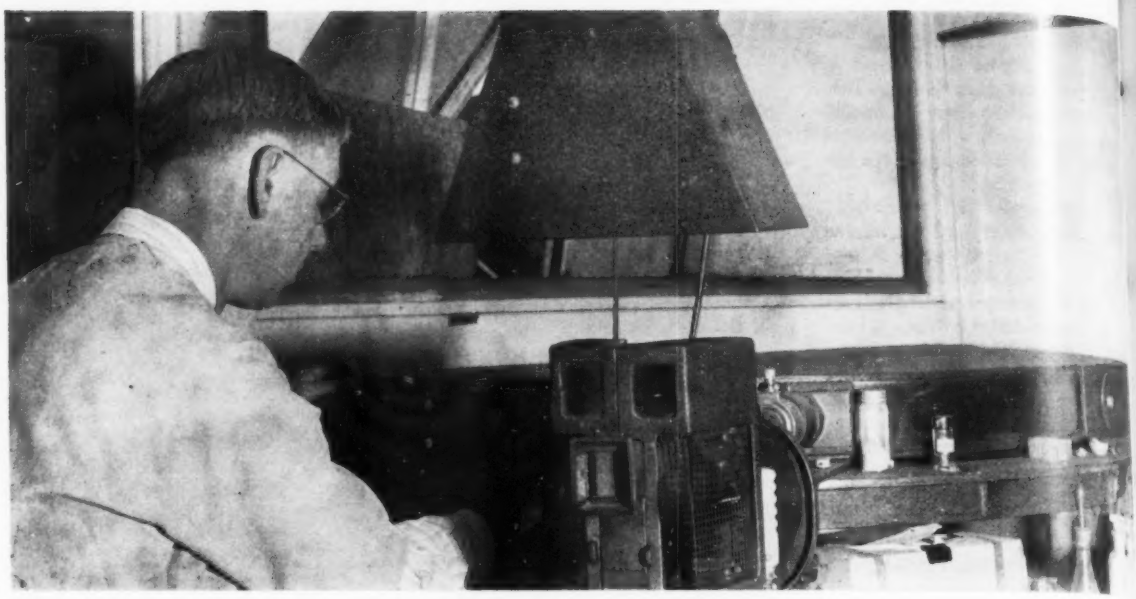
Overflows from both classifiers are joined and sampled by a Geary-Jennings automatic sampler, and flow to either side of a double pump surge box. This box is located lower than the grinding floor and directly below the upper end of the flotation floor. A regular and a spare 4-inch Hydroseal pump are set below and on opposite sides of the surge box. Only one pump is used to elevate the pulp to the lead flotation circuit. The other pump is a standby and the pulp can be directed to either side of the divided box, depending upon which pump is in operation.

Flotation Facts

The Van Stone mill is unique in its use of three different flotation machines. Each type was selected for a specific place in the flowsheet and to perform a certain metallurgical operation under conditions imposed by the nature of the ore.

Agitairs are used for the rougher lead circuit. Close control is neces-

(*Continued on page* 68)



The spectrograph with the arc unit in place.

WHAT RARE ELEMENTS ARE IN YOUR ORE?

A spectrograph will give you the answer with odds favorable for finding gallium and lanthanum, but 30,000 to 1 against rhenium and hafnium

By T. Chester McBurney
Spectrochemist, Smith-Emery Company
Los Angeles, California

No matter how expert one becomes in the identification of minerals, there is always the possibility of missing some rare and valuable chemical elements. Especially is this true in the case of the more complex minerals in which one finds the rare earths in combination with such elements as titanium, tantalum, and columbite. Or there might be a small nodule, phenocryst, or inclusion that has unusual properties. The Spectrograph is partiicularly well-fitted for the analyses of these rare complex minerals occurring in minute amounts.

What Is A Spectrograph?

The key to this method of analyses is the spectrum which Webster defines as being the dispersion (by prism or grating) of a beam of radiant energy (as light) so that its rays are arranged in a series in the order of their wave lengths. Then a spectroscope is an instrument that produces this spectrum, which can be viewed by the operator; whereas a spectrograph is one in which the spectrum is recorded—usually on a photographic plate or film. Since the spectrum I use is mostly in the ultra-violet range it is necessary to record it by photography. The term spectrochemical analysis is one in which the chemical elements of a substance are identified and estimated by means of the spectrum. For most of my work in the analysis of ores and minerals I use the emission spectra as produced in the direct current carbon arc.

An Important Discovery

One of the most recently publicized uses of the spectrograph was in connection with the bastnasite discovery at Mountain Pass, California. The mineral had only slight radioactivity which indicated a low thorium content making it of doubtful fissionable value. However, the spectrograph revealed a high proportion of the more valuable rare earths and the Molybdenum Corporation of America is now mining and processing this material for rare earths recovery. The horizontal band marked "I" in the accompanying series of spectrograms shows these rare earths. According to D. F. Hewitt of the United States Geological Survey, if the present development at Mountain Pass continues it will be one of the chief sources of rare earths in the North American continent, and will render the United States independent of the rest of the world for its supply of these strategic materials.

History and Development

In 1913 Bohr stated that electrons revolve about the nucleus of the atom in discreet orbits according to ordinary mechanical laws such as those that control our solar system. When energy in the form of an arc or high potential spark is applied to a chemical atom, the electrons of the two outer orbits are forced into higher energy levels. This is called excitation and results in the emission spectra. These electrons seek to return immediately to their original level, and in so doing emit light that represents the amount of energy lost which is recorded as a spectrum line characteristic of the element involved.

Thus, most of the development and application of the spectrograph to chemical analysis or spectrochemical analysis has occurred since 1913, and more particularly since 1930. Spec-

men as Meggars, Brode, Dieke, Gerlach, and Harrison have led the way by developing techniques, classifying spectral lines, and improving instruments. The second stage of development during the past decade was making the instruments commercially available, and developing better controlled source units.

The Spectrograph's Operation

In order to describe the process in a clearer fashion, photographs of the equipment as set up in the laboratory are included with this article. One shows the spectrograph*. This is classed as a grating 1½ meter instrument with a dispersion of 6.91 Angstrom per millimeter, in the first order. The housing directly in front contains the arc. The slit is hidden behind this housing. The grating is in the rear, and the camera with the film is on the left. A direct current, 250-volt arc, which passes between two ¼-inch pure graphite electrodes is used. The light passes through the slit which is about 20 microns in width, onto the grating. This grating is a concave piece of hard polished metal on which are ruled 24,400 lines per inch, evenly spaced. Aluminum metal is sputtered to it for protection and to produce a good mirror surface. The light after being diffracted by the grating is reflected and focused on the film in the camera. The light path is shown in diagram.

*Manufactured by Applied Research Laboratories, Glendale, California.

COMPARISON OF ELEMENT OCCURRENCES AS FOUND BY SPECTRA

Not Found	*Seldom Found*	*Rare—Found Frequently*	*Very Rare—Not Found*
Oxygen	Thallium	Cerium	Polonium
Nitrogen	Caesium	Yttrium	Astatine
Sulphur	Rubidium	Ytterbium	Francium
Selenium	Scandium	Neodymium	Technetium
Chlorine	Rhenium	Praseodymium	Actinium
Fluroine	Beryllium	Columbium	Protactinium
Bromine	Lithium	Gallium	Neptunium
Iodine	Germanium		Plutonium
Hydrogen	Indium		Americum
Helium	Hafnium		Curium
Neon	Tantalum		Berkelium
Argon	Samarium		Californium
Krypton	Promethium		
Xenon	Europium		
Radon	Gadolinium		
Carbon (Graphite electrodes used)	Terbium		
	Dysprosium		
	Holmium		
	Erbium		
	Thulium		
	Lutetium		
	Lanthanum		

Analysis Procedure

The procedure of analysis is as follows: After the sample is finely ground and thoroughly mixed, it is placed in a small cup of the lower carbon electrode or anode, the arc is struck and the burning continued until all the elements in the entire sample are volatilized or consumed. This volatilization or excitation produces a special light, which is recorded on the film as spectrum lines, characteristic of each element present. That is to say, each element produces emission lines in the

The projector-densitometer permits rapid identification of the element lines and estimation of the amount of the element by the relative density of the lines.

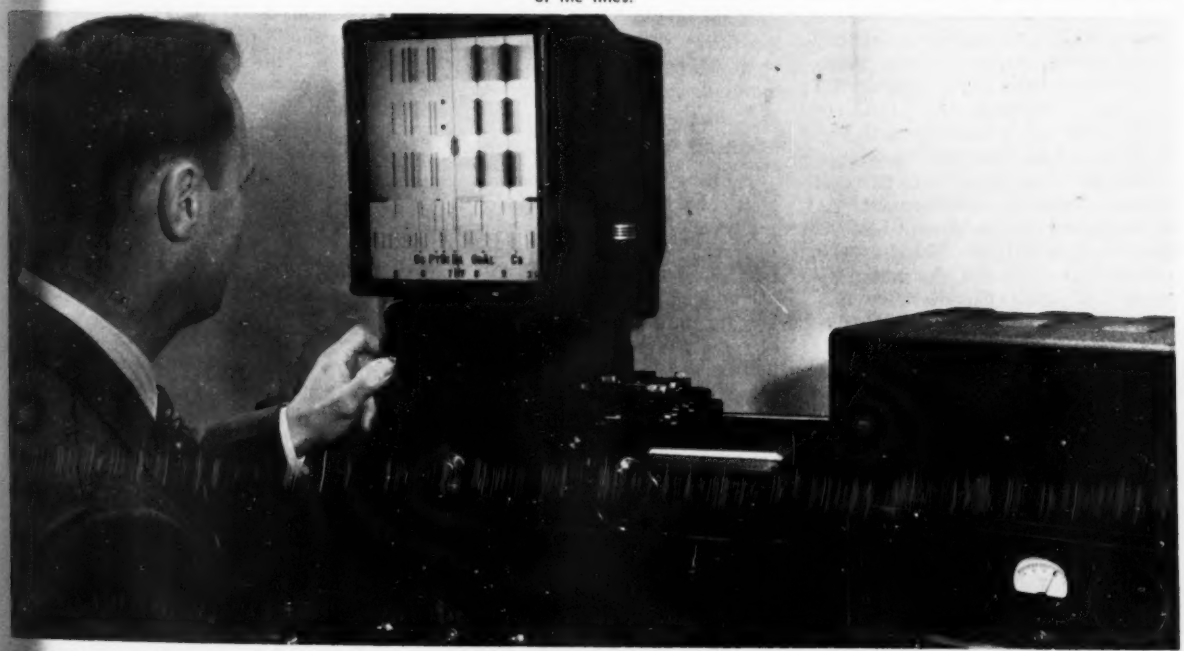


Table No. 1
Elements Determinable by the Arc Spectograph with Sentitivities in the Ultra-Violet Range

Element	*Wave length of line*	*Optimum sensitivity per cent*
Silver	3280.7	0.0001
Aluminum	3961.5	.0001
Arsenic	2780.2	.01
Gold	2675.9	.001
Boron	2497.7	.001
Barium	4554.0	.0001
Beryllium	3131.6	.0001
Bismuth	3067.7	.001
Calcium	4226.7	.0001
Columbium	4059.0	.001
Cadmium	3261.0	.01
Cobalt	3453.5	.0001
Chromium	4254.3	.0001
Caesium	4593.2	.001
Copper	3247.5	.0001
Iron	3020.6	.001
Gallium	2943.6	.001
Germanium	3039.1	.001
Hafnium	2820.2	.01
Mercury	2536.5	1.0
Indium	4511.3	.0001
Iridium	3220.7	.01
Potassium	4044.2	.1
Lithium	3232.7	.01
Magnesium	2852.1	.0001
Manganese	4030.8	.0001
Molybdenum	3132.6	.001
Sodium	3302.3	.01
Nickel	3414.8	.001
Osmium	2909.1	.001
Phosphorus	2555.0	1.0
Lead	2833.1	.001
Palladium	3404.6	.001
Platinum	3064.7	.001
Radium	3814.4	.001
Rubidium	4201.8	.001
Rhenium	3460.5	.001
Rhodium	3434.9	.001
Ruthenium	3499.0	.001
Antimony	2598.1	.01
Scandium	3911.8	.01
Silicon	2882.6	.0001
Tin	3175.0	.001
Strontium	4077.7	.0001
Tantalum	3311.1	.01
Tellurium	2385.8	.1
Thorium	4381.9	.1
Titanium	3372.8	.001
Thallium	3775.7	.001
Uranium	4241.7	.5
Vanadium	3184.0	.001
Tungsten	4008.8	.001
Yttrium	3242.3	.001
Zinc	3345.5	.01
Zirconium	3392.0	.01
15 rare earths, La to Lu	Average	.02

spectrum, which are always found in exactly the same place.

By knowing the location of these lines, it is thus possible to identify the chemicals. "Exactly the same place, means just that. Considering that one Angstrom is equal to 1/10,000,000 of a millimeter, and these spectrum lines can be placed to 1/10,000 of an Angstrom, there is accurate, minute measurement. As an example, the cadmium line at 6438.4696A has been taken as the standard for all length measurements; but lately the mercury line at 5460.7532A (Isotope 198) has been recommended as the standard.

The instrument used in reading the lines is called a projector-densitometer. The image of the film is projected onto the screen as shown, along with a master scale at the bottom. This scale shows the Angstroms or location of the lines in the spectrum at the lower edge, the iron spectrum in the middle, and a number of the more sensitive element lines at the top. In the head of this instrument there is mounted a photo-electric cell by means of which the relative intensities of the lines can be read on the galvanometer scale as shown in the left-hand corner. By comparing these density readings with line densities of known amounts, it is possible to arrive at a quantitative result.

Identify What Elements?

In Table No. 1, there are listed 70 chemical elements together with the sensitivities which can be determined in one analysis by means of the emission arc spectrograph. But, where are the other 22 of the 92 elements? (or 98, if you include the synthetically produced atoms). Under the conditions of the arc, there are elements whose lines fall outside of the ultra-violet region being used. These elements, (see box) include sulphur, selenium, nitrogen selenium, nitrogen and oxygen, and the halogens—chlorine, fluorine, bromine, and iodine. Carbon is another element which is not determined, so we do not examine rocks for diamonds!

To analyze the table further, note in the last column that the optimum sensitivity of some of the element lines are given as 0.0001 percent, others at 0.001, and so on. Knowing that 13 of the elements can be determined to the extent of 0.0001 percent or one part per million, and the fact that less than 20 milligrams are taken for a sample, it is apparent how well the spectrograph is adapted to the determination of small quantities of constituents in small amounts of original ore or rock sample. There are 25 elements at the 10 parts per million level, 26 including rare earths at 100 to 200 parts per million, 4 at 0.1 to 0.5 percent and 2 at 1.0 percent.

Element Frequency Confirmed

A study of the frequency distribution chart of the spectrographic analyses of several thousand samples of rocks and minerals indicates a very close agreement with the actual abundance of the elements as occurring in nature. That is to say, after oxygen, the order of abundance is silicon first, aluminum second, then, iron, calcium, sodium, potassieum, magnesium, titanium, and phosphorus, to name the first 10. These account for all the earth's crust, except about 0.60 percent. There are a number of chemical elements (see box) that, in the 30,000 samples analyzed, I have very seldom found, namely: caesium, hafnium, radium, rhenium, rubidium, thallium, tantalum, germanium, indium, scandium, the platinum group, and some of the rare earths.

Although beryllium and lithium are found in considerable quantities in certain minerals as beryl and spodumene, respectively, it is very seldom that we encounter either of them in this laboratory. The rare elements are usually found grouped in nature with the same elements they are grouped near in arranging the Periodic Table. Some examples are: hafnium with zirconium, caesium and rubidiu mwith the alkalies, indium and germanium with zinc, thallium with lead, and gallium with aluminum.

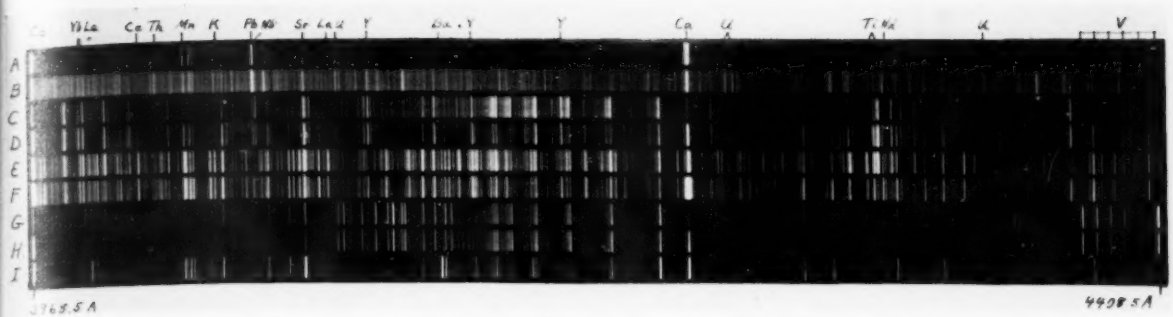
Rare Not Always Valuable

It has been established, in fact, that gallium has formed an equilibrium with aluminum, so that in the refined metal it is present averaging 0.014 percent. This is one of the elements thought of as rare, yet its occurrence is a frequent as aluminum.

For the past five years, gallium has been isolated and refined by two large chemical producers in this country at the rate of only a few pounds per annum. Due to its scarcity and cost of refining even as a by-product, the price of gallium is high —$30.00 per ounce (about the same as gold). Many ores, such as bauxite, contain 0.03 percent of the element or 10 ounces per ton. At $300.00 per ton and thousands of available tons, this looks like a lot of money. However, I want to warn the prospector that it is a long, costly process from the ore to the refined metal, even with unlimited raw material.

Niobium, lanthanum, cerium, yttrium, and ytterbium, are other so-called rare elements that are found quite frequently. Table No. V lists the very rare elements, most of which have only lately been isolated or produced synthetically. The spectrograph has done its share in isolating and identifying these elements.

As a final proof of the wide range and adaptability of the spectrograph, I am including nine spectrograms of radioactive and rare earth minerals combined in one diagram for ease of comparison. As noted in the caption for the various spectra the minerals comprise some of the most complex molecules, and offer the greatest difficulty in chemical analysis of any inorganic materials. The region of the spectrum shown from 3968.5A to 4408.5A was chosen because more element lines of the rare earth and radio-active minerals occur in this section. Fifteen of the more significant elements have been marked (some by two or more lines), which are used to analyze and identify the



SPECTRA AND CORRESPONDING MINERAL ANALYSES

Spectrograph Marking	Mineral	Composition	Occurrence	Form and Color
"A"	Pitchblende	U_3O_8—50%	Great Bear Lake Canada	Black-amorphous
"B"	Broggerite	U_3O_8—80%	Norway	Black crystals
"C"	Euxenite	$(Ti,Cb)_2(R.E.)ThO_6$	Brazil	Brown-amorphous
"D"	Blomstrandine	$(Ti,Cb)_2(R.E.)ThO_6$	Norway	Brown-crystals
"E"	Chevkinite	$(Mn,Ca,Mg)O[Al,Fe,(R.E.)]_2O_3(So,Ti)O_2 + Th$	Arizona	Brown-amorphous
"F"	Allanite	$[Ca,(R.E.),Th]_2(Al,Fe,Mg)_3Si_3O_{12}(OH)$	Arizona	Brown-amorphous
"G"	Carnotite	$K(UO_2)VO_4 \cdot \times H_2O$	Colorado	Yellow-scales
"H"	Tyuyamunite	$Ca(UO_2)_2(VO_4)_2 \cdot \times H_2O$	Colorado	Yellow-crystals
"I"	Bastnaesite	$(R.E.)FCO_3 \cdot Th$	New Mexico California	Brown-amorphous

(R.E.) = Rare Earths: mostly cerium, lanthanum, neodymium, and ytterbium oxides.

different minerals. These spectrograms are arranged in pairs (except for "I"), in order to bring out the similarities or differences.

"A" and "B" are spectrograms of two pitchblendes or uraninites: "A" from Great Bear Lake, Canada; "B," called broggerite, is from Norway. The pitchblende is black amorphous, while the broggerite occurs in small crystals. There is much more uranium in "B" than in "A," that from Great Bear Lake analyzing 50.0 percent, and the broggerite 80.0 percent. This high percent of uranium causes a continuous spectrum or a continuum, as seen in "B." The lead appears about equal as indeed analyses indicate about 10 percent in each. The traces of rare earths occur equally in the two minerals as noted by a comparison of the line densities of lanthanum and cerium.

"C" and "D" are spectrograms of two minerals that were taken from different parts of the world, and were shown to bring out the similarities of composition. Even though "C" is a euxenite-polycrase from Brazil and is amorphous, and the other, "D," a crystal of blomstrandine from Norway, yet the likenesses of the two are striking. The significant elements, columbium and titanium, show identical line densities, as well as the lanthanum, cerium, and yttrium. Calcium and ytterbium are the only ones that show a difference, both being higher in the blomstradine.

"E" and "F" are spectrograms of two minerals that often occur together, and are so similar in structure and appearance they are often mistaken for each other. "E" is a chevkinite, and "F" is an allanite, both from Kingman, Arizona. The main difference is that the titanium content of the chevkinite should average 20 percent, while 0.1 to 0.3 percent is all that is found in the allanite. Otherwise, the two minerals are very similar as wil lbe noted by the same densities of the ytterbium, lanthanum, cerium, and thorium lines in the two spectrograms.

The pair "G" and "H" are spectrograms of two uranium-vanadium minerals, "G" being a carnotite $K_2(UO_2)_2(VO_4)_2 \cdot 3H_2O$ from Colorado, and "H" tyuyamunite $Ca(UO_2)_2(VO_4)_2 \cdot nH_2O$ from New Mexico. The vanadium is about equal in the two, while the uranium content is considerably lower in the carnotite from Colorado. The potassium line is shown for the latter, while the heavy calcium line indicates a considerable amount of that element in the tyuyamunite the "K" line does not show in this case.

The bastnaesite spectrogram "I," as mentioned previously, indicates considerable amounts of the rare earths, lanthanum, cerium, and ytterbium, and a small percent of thorium. The presence of such large quantities of these rare earths gives it a high strategic value.

Improvements For Growing Uses

In conclusion, it might be well to consider the future of spectrochemical analysis. At the present time, the spectrograph is being adapted to wider fields of metallurgy, of mineralogy, and biology. It is being stepped up in both precision and speed. In some fields it excels the chemist in both accuracy and rate of analysis—notably the metals industry. The ratio of the speed of the spectrograph using photography to the chemist is about 1 to 15, whereas the direct reading instruments reduce this ratio to 1 to 200. In other words, the spectrograph can do in 30 seconds what it requires all day for the chemist to do. In addition it is more accurate and can analyze more elements simultaneously—at least 15 easily. Since it is able to determine the rare elements with equal facility, it is invaluable as a research instrument in seeking out new occurrences. Furthermore, the spectrograph will continue to serve in the realms of pure science in revealing more clearly the structure of the atom.

References

A Method of Semi-Quantitative Analysis, Harvey. Spectrochemical Procedures, Harvey. M.I.T. Wavelength Tables, Harrison. Chemical Spectroscopy, Brode. Practical Spectroscopy, Harrison, Lord, and Loofbourow. Experimental Spectroscopy, Sawyer. Composition of Earth's Crust, Clark and Washington, 1924. Index to Literature on Spectrographic Analysis, Meggers & Scribner (A.S.T.M.) Parts 1 and 2. Principles and Practice of Spectrochemical Analysis, Nachtrieb (A practical book on Spectroscopy), Spectrochemical Analysis, Ahrens.

El Mochito Makes Silver-Lead Recovery In Presence of Interfering Manganese Oxides

A successful method for treating a high-grade silver ore containing many oxide minerals, including deleterious manganese oxides, has been perfected by the New York & Honduras Rosario Mining Company. Harold R. Robinson, general mill superintendent for the company, has done an outstanding job in working out a successful flow sheet.

The firm operates the El Mochito mine in the northwestern part of Honduras, just west of Lake Yojoa in the Department of Santa Barbara. Its complex silver-lead ore occurs as a replacement in limestone. The metallurgy is made difficult because of the presence of the oxide manganese minerals pyrolusite, psilomelane, and wad in varying amounts, with the manganese content running from 3.0 to 35.0 percent. The silver occurs as native silver, as ruby silver, and as absorbed silver locked within the manganese oxides which makes extraction difficult. The galena, much of which has a superficial coating of anglesite ($PbSO_4$), makes recovery low. Lead also occurs as cerrusite ($PbCO_3$), mimetite ($Pb_3AsO_4PO_4)_3Cl$, and as minium (Pb_3O_4). The sphalerite includes lead minerals locked within it so that even fine grinding does not help in freeing of the lead. Zinc minerals are sphalerite (ZnS), marmatite (Zn.xFeS), and smithsonite ($ZnCO_3$). The sphalerite is active and very difficult to depress, while little or no recovery can be made on the smithsonite. Small amounts of chalcopyrite are present, some of which have been oxidized, along with pyrite and iron oxides.

Flotation Reagents and Point of Addition at the El Mochito Mill, Honduras[1]

Reagent	*Quantity in Pounds*	*Point of Addition*
$ZnSO_4$	0.162	Ball mill
Na_2S	0.091	Several[2]
Aerofloat 31	0.082	Table tailing
Reagent 301	0.111	Conditioner
Reagent 404	0.178	Conditioner
Yarmour pine oil	0.246	Conditioner
Metso	0.153	Cleaner flotation cells
Aero cyanide	0.082	Recleaner flotation cells

1. The cyanide plant uses 12 to 15 pounds of lime as 60 percent CaO per ton of ore, and from 6 to 9 pounds of Aero-brand cyanide, depending on head values to the Pachucas per ton of ore.
2. Sodium sulphide is added at several points—ball mill, flotation cells, etc.

Jig-Table-Flotation Circuit

One hundred and twenty tons of ore are milled per day and are delivered to the mill in Ford dump trucks. Here, the ore is weighed and crushed to minus-1½-inches through a Gates No. 3 Style D crusher. Primary grinding is carried out in an Allis-Chalmers 6 by 5-foot ball granulator charged with 5-inch ARMCO alloy steel balls. The mill is in a closed circuit with an 18 by 24-inch Denver duplex mineral jig and a 4 by 18-foot Dorr FX duplex classifier. The Jig hutches are drained every hour, the product being filtered in a pressure filter and delivered to the drier. The classifier overflow is split between two No. 6 Deister diagonal deck slime tables where a lead concentrate is cut off which includes all of the oxides that separate out. The table product is filtered and mixed with the jig concentrate for drying and shipping. Some of the flotation reagents are added to the table tailing in a small conditioner for about five minutes of conditioning time ahead of flotation.

Flotation is carried out in a bank of eight No. 36 Massco-Fahrenwald cells, five of them being used as roughers, two as cleaners, and one as a recleaner. The flotation feed is about 12 percent plus-100-mesh. A bulk concentrate is produced which is dewatered by means of a 6 by 4-foot Olivier filter and dried by means of steam so that it contains about 1.3 percent moisture. The jig and table concentrates are packed in oil drums and the flotation concentrate in cyanide drums for shipment.

Regrind for Cyanidation

Flotation tailing is returned to the secondary classifier which is a duplicate of the primary except that the rakes are operated at 12 strokes per minute. This unit is in closed circuit with an Allis-Chalmers 4 by 6-foot ball granulator charged with 1½-inch alloy steel balls. The classifier overflow solids are about 12 percent plus-200-mesh, and are settled and thickened in two 35 by 10-foot Denver thickeners. The overflow goes to waste and the underflow, which is about 60 to 62 percent solids, is delivered to two dewatering filters by a 2-inch, rubber-lined Wilfley pump. One disc filter, 6 feet in diameter with 5 discs, and an 8 by 12-foot Oliver filter are being used for dewatering. The filtered cake is repulped in barren cyanide solution; it flows to an 8 by 8-foot Denver agitator where a lime slurry is added before going to the agitators. Batch agitation is carried out in seven 12 by 36-foot-high Pachuca tanks, each batch receiving 60 hours of treatment time. Aero-brand cyanide is added directly to the tanks to bring the solution to strength. Agitation is effected by 30 cubic feet of air per minute under 20 pounds pressure. Air is furnished by a 14 by 10-IR compressor.

The Pachucas are discharged directly into the No. 1 counter-current thickener at the same rate at which they are filled. There are four counter-current thickness, eacah 35 by 10 feet. Barren solution is used in the No. 3, and water in the No. 4 for washing. The underflow from the No. 4 is filtered in a 5-disc, 6-foot-diameter Denver filter and an 8 by 10-foot Eimco drum filter. The filtrate is returned to the No. 2 counter-current tank, and the cake is repulped in water for disposal. Vacuum for the two dewatering filters ahead of the cyanide plant and for the two filters on the tailing is furnished by two, 22 by 9 inch, IR vacuum pumps.

Precipitate Dried by Infra Lamp

The pregnant solution from the No. 1 counter-current thickener is pumped to the storage tank ahead of the precipitation by three IR motor pumps. The solution is clarified in a filter which has 38 leaves, covered with unbleached muslin and washed daily. Eight hundred and fifty tons of solution are precipitated daily through the Merrill-Crowe system. The solution is measured by means of a Rockwell balanced meter. Merrillite zinc dust is used as the precipitant and the precipitate is collected in three, 36-inch, triangular Merrill presses having 10 plates and frames each.

The precipitates are dried by means of infra-red lamps and are melted once a week in an oil-fired Monarch-type furnace using borax, soda, fluorspar, silica, and broken glass as a flux. The Dore bullion is cast into bars weighing 105 pounds each.

HOW TO USE GROUTING TO CONTROL WATER INFLOW TO MINE WORKINGS

By **Robert S. Mayo**
Mayo Tunnel & Mine Equipment Company
Lancaster, Pennsylvania

Grouting in and around mines is an entirely different problem than that encountered in tunnels. To begin with, most mines are a good deal deeper than the ordinary tunnel; therefore, the hydrostatic pressures will be much greater. Secondly, mines have a definite "life"; therefore, there is an economic ratio between cost of grouting and the eliminated cost of pumping. Thirdly, and most important, water which has been sealed off from shafts or haulageways by grouting may find its way into stopes and have to be pumped out anyway.

Control of Water In Shafts

In the sinking of shafts, underground water courses will be encountered which will make the shaft a very disagreeable place in which to work. It is quite important, for this reason alone, to stop or at least control this water. In most cases this can be done simply. If the water is not under high pressure, it will be possible to grout it off completely. If the water is under high pressure, or if it is considered that it may find its way into the stopes, it will probably be best to grout only enough to concentrate all the flow in one "weeper pipe." Once the flow is concentrated, the suction of a sinking pump can be attached to the weeper pipe and the water pumped directly to the surface.

The procedure for grouting wet seams is simple. Grout nipples (Figure 1.) are wedged into drilled holes intercepting the fissure. The sides of this fissure are then caulked with Oakum or with burlap bags held in place with soft wood wedges. This will divert the flow into the pipes. The hose from the grouter is then connected to one of the grout nipples, using an assembly of valves (*Figure 3.*) which has a vent cock to allow the escape of water or air. Grouting is then commenced and is continued until the grout appears at adjacent holes. The retaining cock is closed, and the hose transferred to the next nipple. This operation is continued until all the flow is forced into one pipe. If it is decided to try to dry the seam completely, several days' time should be given for this grout to properly set. The grout hose then is attached to the last nipple and grout forced in at the necessary pressure until it is refused.

When an extensive water zone is encountered while sinking a deep shaft, it is good practice to cut a pump room in the side of the shaft (Figure 3). All the flow from this zone can be diverted to this room where it will be pumped to the surface. In shallow shafts, it will probably be more economical to pipe this water downward and into the sump at the bottom of the shaft.

Sinking Through Shattered Rock

In shaft sinking, there will be occasions when zones of shattered rock will be encountered, generally passing across the shaft at an acute angle. These zones might be due to faulting or from subsidence of adjacent mines. When passing through such zones, of course, the ground will be supported by either wood or steel sets. It may be worth while to grout this fractured zone to relieve the load against the timbers and to prevent further movement of the ground (Figure 3).

Grouting of such ground is not difficult, but the problem is to caulk all the cracks and fissures to prevent the grout running back into the shaft during the operation. This can be done by wedging burlap bags into the larger opening, or plastering the smaller ones with cement mortar. It is generally best to first grout with a coarse mixture through shallow holes using low pressure. Once this grout has set, deeper holes are drilled and grouting is continued, using a thinner mixture and higher pressure. It is possible to solidify the rock for 30 feet or more around the shaft.

A stratum of fractured rock which contains large quantities of

A Mayo pneumatic grouter pumping cement grout behind concrete lining to stop leaks in a tunnel.

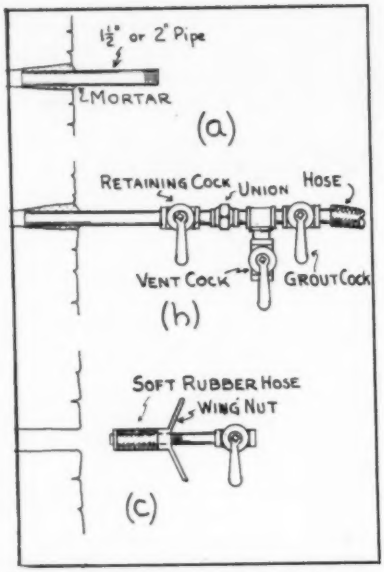


Figure 1. a) Typical grout nipple. b) Connecting the grout hose to a grout nipple. c) Removable grout nipple. Tightening the wing nut causes the rubber hose to expand and grip the side of the drilled hole.

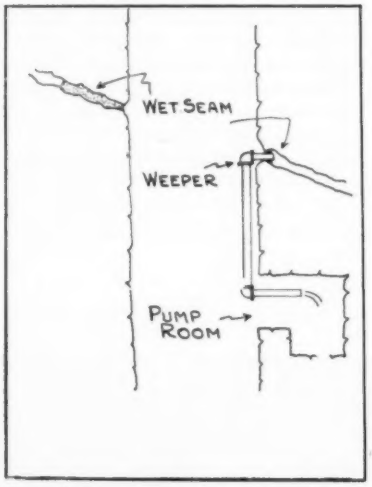


Figure 2. Pump room cut in a deep shaft to handle large flows.

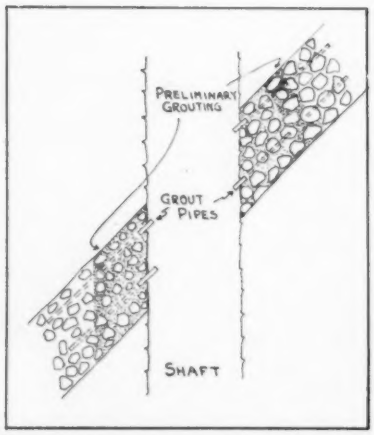


Figure 3. Grouting fractured zones to solidify ground.

flowing water may be very difficult to control. The flowing water will wash out the grout before it has a chance to set. In this case it may be necessary to inject sawdust, screened cinders, oats, or chopped horse manure to choke off the flow enough to allow a thick grout to be forced in. In some cases, the oats may be added to a sand-cement grout and will be injected at the same time. Under such conditions, it will be necessary to use two groutings. The first will be a thick sand-cement mixture to control the flow. The grout holes will then be redrilled to a greater depth, and a thin mix injected to stabilize a wider area.

Control of Water in Drifts

Underground flow of water into tunnels and drifts may be easily controlled by the use of grout. Here again, it will probably be unwise to try to stop all the flow. The best thing to do is to concentrate the flow into the lower weeper holes (Figure 4) where it can be channelled directly into the drainage ditch. This can generally be done by low-pressure grout. Excessive grout pressure may simply force the water to find its way into an adjacent stope.

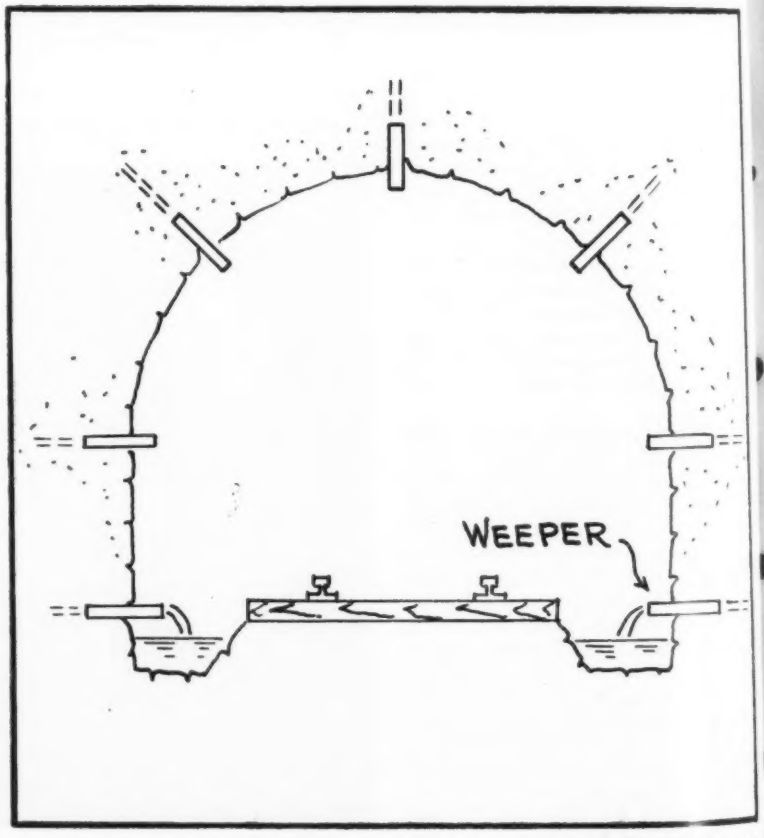
Drifts will frequently encounter zones of fractured rock of a material similar to those mentioned in shaft sinking. Judicious grouting can solidify this rock, forming a "bridge" over the tunnel which will relieve the weight on the timbers and reduce caving and maintenance.

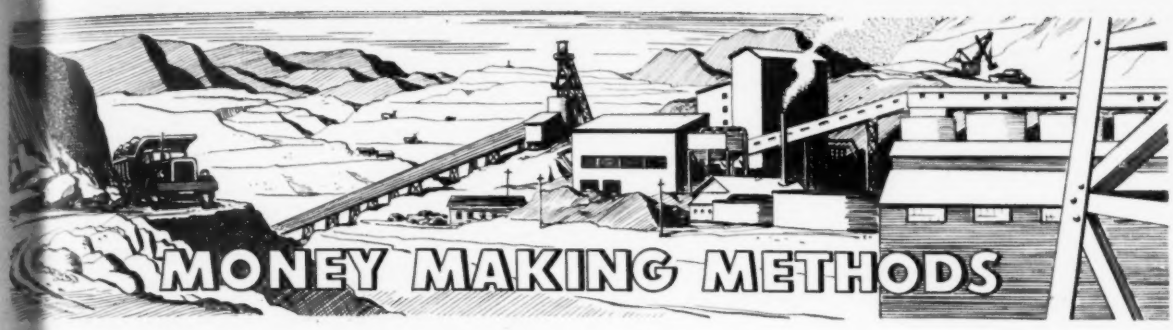
Conclusion

Grouting can be employed profitably in shaft sinking and in the driving of tunnels or haulageways to control the flow of water and to reduce the amount of timber necessary. Grouting has long been used in the tunneling industry and should find wide application in the newer and deeper mine developments.

As the San Juan country was developed and new roads began to loop across other passes, Stony Pass was forgotten, but much of the early history of the region is intimately connected with its rugged, bony surface which was hacked out of the rock on the stark mountain range.

Figure 4. Control of water in tunnels.

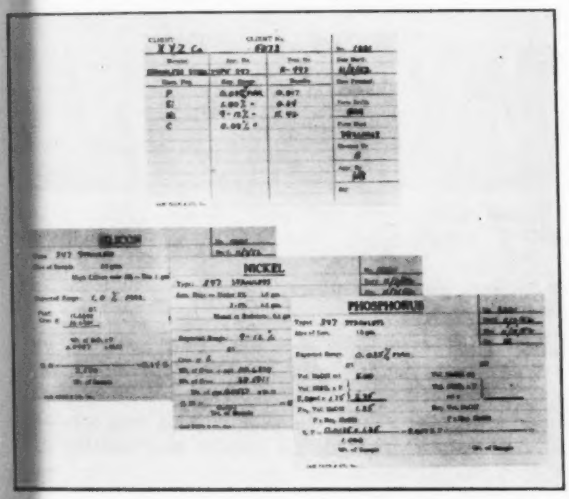




PLANNED CARD SYSTEM SPEEDS SAMPLE RECORD AND ANALYSIS

A timesaving system of records control for following the progress of routine analytical work on large numbers of samples has been developed by the analytical section of the chemical engineering department of Sam Tour & Co., Inc., New York, New York.

This system offers two important advantages in simplifing the operation of an analytical laboratory. First, it enables supervisory personnel to know at a glance the progress of work involving a series of analytical steps. Second, it saves the chemist who actually does the work a considerable amount of non-productive clerical time by giving him a simplified, standardized form, complete



with pre-calculated constants, on which to record and calculate his results.

The records system is based on a set of 4- by 6-inch cards, such as that illustrated. Each set has a master card which contains information about the origin of the sample, the series of analyses required, and finally, the results of each analysis as they are reported. Each of the remaining cards in the set corresponds to an individual analysis, and these cards are distributed to personnel who perform the analysis. These analysis-data cards identify the sample and give the expected range of results. For certain analyses, the weight of sample needed to insure accuracy within the expected range is already stamped on the card.

The analysis-data cards are printed so that all data needed for subsequent calculations, (such as the weight of sample, weight of precipitate, or volume and normality of titrant) are written in a space where they are used directly in the calculations. Thus, time is saved and the possibility of error is greatly reduced because an absolute minimum of recorded data is necessary.

Another timesaving feature is that, whenever possible, all numerical factors required to convert the analytical data to the form desired (for example, as percent of silicon in a steel alloy) are pre-calculated as a single constant which is printed in the appropriate place. In this way, the results can be obtained quickly with a few slide rule operations. In some cases, it is impractical to print the actual value of the factor of the card, because, for example, the strength of the standard solutions used may vary from day to day. Thus, in the phosphorus analysis, the numerical value of the correct factor is inserted by the analyst where the letter "F" appears.

As each phase of the analysis is completed, the results are recorded on the analysis-data card, along with the date of completion, and initialed by the analyst. The data cards from these completed phases are then recorded on and attached to the master card in the file. Thus, merely by referring to one file, supervisory personnel can obtain in a matter of seconds the following information about any specific analytical sample: time sample received; type of sample; how much of the analysis is completed; the results and date of their completion; how much remains to be done; the individuals respousible for individual phases of the work; and the data from which the calculations were made.

The cards illustrated were selected from a set used for the analysis of steel alloys, where the analysis is concerned with finding the percent of the various alloying elements present. However, the same system is easily adaptable to any quantitative work involving a series of analytical steps. The system can be set up simply by planning what data is needed, supplying the constants to convert this data to final results, and setting up the card in a convenient-to-calculate form.

STOP LEAKS WITH NAVY PATCH

Of possible interest to the mining fraternity is a new patch for emergency repairs of damaged piping on Navy vessels. The patch consists of a resin solution reinforced with glass fiber, and may be applied in a few moments. After setting, it gives a water-tight seal which will stand heating to 450° F., and is resistant to gasoline, dry abrasives, and various chemicals. It may be applied to pipe made of steel, iron, lead, aluminum, or porcelain. Use of the patch is expected to become standard on Navy ships. It is also being considered for stopping seepage from rivited gasoline storage tanks, and for repairing ducts carrying dry abrasives. Although the patch was developed for temporary repairs, it may prove useful for long-term service.

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Dimensions and contours of this giant bus assembly were proved accurate here on templets matching those of the smelter to which it was shipped.

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You profit by this practice. Time spent in our plant is saved in yours, so your furnace gets into production sooner.

We help you in other ways.

Lectromelt engineers are familiar with the use of electric arc furnaces for smelting, refining and melting operations. They can help you select the Lectromelt equipment you need and will advise on the designing of your furnaces.

For Bulletin 104 telling you more about these furnaces and services, write Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pa.

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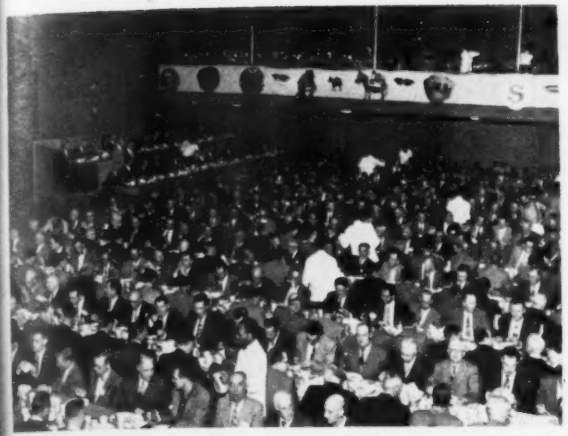
WHEN YOU MELT.. MOORE RAPID Lectromelt



LEFT: Yes, Sowbelly and Beans at the world-famous Sowbelly Dinner concluded the 56th annual convention of the Colorado Mining Association and the National Western Mining Conference. RIGHT: Guests at the head table at the Gold and Silver Banquet (right background) included the following Washington officials. Senator George W. Malone, chairman, Minerals and Fuels Subcommittee of the United States Senate; Senator Bourke B. Hickenlooper, chairman, Senate Committee on Atomic Energy; Congressman A. L. Miller, chairman, House Interior and Insular Affairs Committee; Congressman Carroll D. Kearns, House Education and Labor Committee; Congressman William S. Hill, chairman, House Small Business Committee; and Eugene M. Zuckert, Commissioner, United States Atomic Energy Commission. Government officials came to Colorado to meet and discuss mining problems with the nation's leading mining executives.

UNITED LEAD-ZINC MINING INDUSTRY FORMS PLAN AT COLORADO MEETING

The 56th Annual Convention of the Colorado Mining Association held in Denver, Colorado, February 12, 13, and 14, was not just another mining convention or machinery exposition. It was the meeting of the nation's base metal producers to unanimously formulate and announce a plan of united action designed to preserve the lead-zinc mining industry in the interest of national defense and security.

This plan, evolved by the National Emergency Committee on lead and zinc, under the chairmanship of Otto Herres, vice president. Combined Metals Reduction Company, Salt Lake City, Utah, has been described "as the most constructive step taken by a united mining industry in the last 20 years by representatives from every lead-zinc district in the United States." It drew national attention following the convention.

While the emphasis was on lead and zinc, a wide variety of technical and economic papers were presented, and the regular top-flight entertainment was part of the Gold and Silver Banquet and the Sowbelly Dinner.

Industry Leaders' Views

Outstanding Convention session was the panel discussion by members of the National Emergency Committee. George Potter of Potter-Sims Mines, Inc., largest independent Tri-State operator, reached the root of the problem when he said that all lead-zinc operators now have a common problem—that of metal prices. The wide fluctuations in prices cause serious operational problems. Under today's era of labor contracts and high supply costs, the mining industry is not able to reconcile production costs with the changes in prices. The result is closing of mines when prices drop.

E. H. Snyder, president of Combined Metals Reduction Company,

The convention's "Uranium Section" featured both industry and governmental uranium experts. The speakers included (left to right): G. W. Thornburg, vice president, Plateau Mining Company; Norman E. Ebbley, consulting engineer, Uranium Ore Producers Association; M. G. McGrath, engineering consultant, Skidmore Mining Company; Ray G. Sullivan, vice president and general manager, Minerals Engineering Company; Sheldon P. Wimpfen, manager, Grand Junction Operations Office, U.S. AEC; and Eugene M. Zuckert, commissioner, U.S. AEC.

Zinc industry leaders from left to right: Russell B. Caples, manager, Great Falls, Montana, Reduction Department Anaconda Copper Mining Company, and president, American Zinc Institute; Richard A. Young, vice president and general manager, American Zinc Company of Illinois; and Ernest V. Gent, executive vice president, American Zinc Institute.

Colorado sets the pace for uranium production and convention coverage. Sheldon B. Wimpfen, newly designated manager Grand Junction Operations Office, United States Atomic Energy Commission; Robert S. Palmer, executive vice president, Colorado Mining Association; and Jesse C. Johnson, director, U.S. AEC, discuss domestic uranium mining after the "Uranium Section."

Salt Lake City, Utah, divided base metal producers into three groups: small producers, independent larger companies, and financially powerful major companies. Under today's prices, he said, the small were closed, the independent closing, and the powerful in serious trouble.

Joseph Taylor, vice president and general manager of the Peru Mining Company, Silver City, New Mexico, outlined the benefits to the nation by producing metal here and added that "imports can and do shut down mines with a loss to all."

Cecil Fitch, Jr., general manager, Chief Consolidated Mining Company, Eureka, Utah, warned that the rapid fluctuations in metal prices discourage all long-range future production and that the small producers cannot survive another boom-bust cycle.

Mason W. Rankin, vice president and general manager, Crested Butte Mining and Milling Corporation, Helena, Montana, reported that his completely mechanized underground mine producing seven tons of ore per man shift had reduced mining costs from $27.00 to $7.00 per ton but was still unable to operate at a profit and was shut down.

C. F. Parker, Jr., vice president and general manager of Telluride Mines, Inc., Telluride, Colorado, said that his company was barely hanging on despite a 35 percent drop in gross income since May 1952.

The National Committee on Lead and Zinc gives its report to the convention. Robert S. Palmer, executive vice president, Colorado Mining Association and committee member, outlines legislative plans. At the top table from left to right are: Otto Herres, committee chairman and vice president, Combined Metals Reduction Company; Jess Larson, former administrator, Defense Materials Procurement Agency; Felix Wormser, vice president, St. Joseph Lead Company; Joseph Taylor, vice president and general manager, Peru Mining Company; and Richard A. Young, vice president and general manager, American Zinc Company of Illinois. At the front table are: C. F. Parker, Jr., vice president and general manager, Telluride Mines, Inc.; George Potter, Potter-Sims Mines, Inc.; Mason W. Rankin, vice president and general manager, Crested Butte Mining and Milling Corporation; and Cecil Fitch, Jr., general manager, Chief Consolidated Mining Company.

Plan Sliding Scale Import Tax

Otto Herres, committee chairman, announced full details of the plan (see *Mining World*, March 1953, page 29) which calls for a sliding scale equalization import tax on lead and zinc to become effective when the base price set as the New York lead price is lower than 15½ cents per pound and the East St. Louis zinc price less than 14½ cents. The import tax on lead and zinc metal should be one cent per pound for each one cent the respective market prices are below the base prices. For lead and zinc in ores and concentrate, the lead import tax should be 7/10 cent per pound and 6/10 for zinc.

Why Import Tax Will Work

W. C. Page, vice president and manager of western mining operations, United States Smelting, Refining and Mining Company Salt Lake City, said that this was the first time the industry had ever gotten together on a program and there was no question but that the plan was fair and needed.

R. A. Young, vice president and general manager, American Zinc

LEFT: Part of the crowd of operators packed in a General Session. Technical sessions were held simultaneously in an adjoining ball room. RIGHT: James E. Dunn, superintendent, Akron Unit Callahan Zinc-Lead Company, presides over the "Small Mines Section." Small mine operators always have their say at the Colorado Convention. Congressman John J. Rhodes (seated at table at far right) of the House Interior and Insular Affairs Committee was especially interested in the small miner. Small miners from Colorado who presented their views are seated at the table with Congressman Rhodes. They are Tom E. Martin, Dillon; Robert L. Jones, Leadville; Merle Lloyd, Silverton; Douglas Watrous, Idaho Springs; W. E. Burleson, Salida; and Charles W. Jordan, Alma.

Company of Illinois, said that the plan was essential and of interest to the public well being. The mining industry is strong for free enterprise and asks no favors in a free enterprise climate, but it cannot compete with foreign governments, he said.

Jess Larson, former administrator, Defense Materials Procurement Agency, spoke with authority based on his multimillion dollar buying of minerals when he said that it was "the most sound, practical, and obtainable procedure to relieve the basic problem that confronts the mining industry."

Felix Wormser, vice president, St. Joseph Lead Company, New York, New York, reported that under the plan no cost would accrue to the taxpayer, it would provide needed revenue, all consumers would fare equally well, would not require any bureaucracy to operate, and would be automatic in operation.

U. S. Gold Committee Progress

George Nugent, chairman of the U. S. Gold Committee, reported how the Committee had grown to 200 members since its founding which was planned at the 1952 convention. The committee has made a complete study of all gold producers adversely affected by World War II limitation order L208 and estimates that 21 dredges, 1,086 placer operations, and 2,619 lode mines in the United States and Alaska were closed by the order. Appealing the order were 168 producers and 137 of these were allowed to continue to operate.

One of the committee's programs is to get the federal government out of the gold selling business in line with the administration's trend of getting out of business. In the last 10 years, the government has sold $620,000,000 worth of gold to domestic users and Nugent urged that the President issue a directive forbidding the government to compete in commercial market and permit the miners to sell direct to consumers.

Small Mines Session

Charles W. Jordan, president and general manager of Buckskin Joe Mines, Limited, Alma, Colorado, outlined his experience with the production and selling of zinc. He said that for the small miner there had been only two periods in the last 30 years when zinc could be mined at a profit. The first was from 1924 until 1929, and the second was under the Premium Price Plan. He added, "What I am trying to point out is that the zinc in your mine is not ore, but only a byproduct of the ores that you mine." What the zinc miner needs is a better process for zinc smelting so that the miner could be paid more for his zinc, he said, and recommended that Congress appropriate money for smelting research.

Walter E. Burleson, Salida, Colorado, operator of base metal mines in Chaffee and Saguache counties, outlined the loss in income to the nation when one small mine closed. In dollars it amounted to $25,000 per month and meant that 90 percent of the unemployed in the counties were miners.

Merle Lloyd, San Juan County, Colorado, mine operator, stressed the importance of mining to the many service industries supported by mining and called for a united program saying, "If success you would see, let's all back the domestic mining industry in 1953."

Uranium Mining Economics

M. G. McGrath, consulting engineer, Skidmore Mining Company, Grand Junction, Colorado, presented a paper detailing uranium economics and showed that the complex payment procedure now in force under the U. S. AEC Circular No. 5, Revised, might be costly to the operator, if allowances were not subject to depletion; if not, the miner would be better off with a uniform price. From a study of a large number of operations, he found that mining problems limit output from 0.5 to 1.5 tons per man shift. Further study proved that it was impossible for a mine to profitably ship any ores assaying less than 0.13 percent U_3O_8. In the final analysis, uranium is like any other ore. You have a pattern of marketing costs which determines the cut-off grade between ore and mineralized rock.

Sheldon P. Wimpfen, manager, Grand Junction Operations Office, U. S. AEC, reported to the nation's miners that while the government was taking an active part in finding uranium deposits it was the job of the mining industry to mine the ore. He added, "The AEC believes that the task of mining can best be performed by private industry and 100 percent of the uranium ore produced in this country is drilled, blasted, loaded, and delivered to receiving stations by private enterprise."

Tungsten Resume

Retiring president of the Colorado Mining Association, Blair Burwell, reported that a bill (H. R. 2824) had been introduced in Congress for the purpose of extending the domestic

Fluorspar was ably discussed by George H. Musson (left), General Chemicals Division, Allied Chemical and Dye Corporation, and C. O. Anderson, vice president, Ozark-Mahoning Company.

Gold miners get together. Harry Sears (left), California Gold Committee, and Frank Bowman, manager, Colorado School of Mines Alumni Association.

tungsten program an additional two years until July 1, 1958. The existing law provided plans and financing to purchase 3,000,000 units of WO_3 by July 1, 1956. There is no chance to purchase the authorized units before the termination date as only 83,000 units had been bought so it was the hope of the mining industry that Congress would extend the program. Burwell next outlined the plans of Minerals Engineering Company for building a tungsten refinery (synthetic scheelite plant, see *Mining World*, April 1952, p. 33) in Salt Lake City, Utah. The plant would have a capacity of 30,000 units per month with treatment charges 30 percent below existing schedules. The tentative charge for toll refining for over 5.00 percent WO_3 concentrate was $15.00 per unit.

Burwell termed the Paley Report "fantastically erroneous," and said that international tungsten speculators had been advisors on the tungsten section. He added that the report set domestic reserves at 100,000 tons which he believed to be too low as only one mine he knew of had 40,000 tons of reserves.

Operations Described

Lyle M. Barker, manager Morenci Branch operations of the Phelps Dodge Corporation, presented an illustrated report on the Morenci open-pit copper mine, flotation plant, and smelter. He reported that in the 15 years since open pit mining was started 435,000,000 tons of material had been moved; 143,000,000 tons of this was ore from which 1,250,000 tons of copper had been recovered.

Frank Wydolph, assistant mill superintendent, Climax Molybdenum Company, told how Climax was successfully recovering minerals that the chemists could not even accurately assay in the Climax molybdenum ore, and recovering them at an important profit too—$0.50 per ton on a daily mill feed which is now approximately 20,000 tons per day. In 1952 when milling averaged 14,000 tons, Climax recovered 660,000 pounds of WO_3, 32,000 pounds of tin, and 9,500 tons of pyrite concentrate. Key to the economical operation of the plant is the use of Humphreys Spirals. Calculating recovery plus tailing loss back against tonnage treated, Wydolph reported that the 0.5 percent MoS_2 ore contained 0.04 percent WO_3 in wolframite, 1.3 percent FeS_2, and a trace of tin.

LEFT: Arizona Congressman Rhodes extends greetings from the Arizona miners to the nation's miners. RIGHT: Uranium miner and exploration expert, Ray G. Sullivan, Minerals Engineering Company, outlines prospecting methods.

Paley Report—And After

John E. Kelly, consultant in natural resources, Washington, D. C. prepared a paper outlining the formation of a new group called the "Resources for the Future, Inc." This group is planning a resources conference for the fall with attendance by invitation which Kelly wrote would not include "state mining associations."

In closing this report on the Colorado Mining Association's convention, it is appropriate to use Kelly's concluding statement, "Resources for the Future poses the old problem where do we go from here? It may be confidently answered that American mining will go further and better under leaders of its own choosing resolving our problems in conferences called by our own state associations, remembering that no nation's economy is sounder than its mines."

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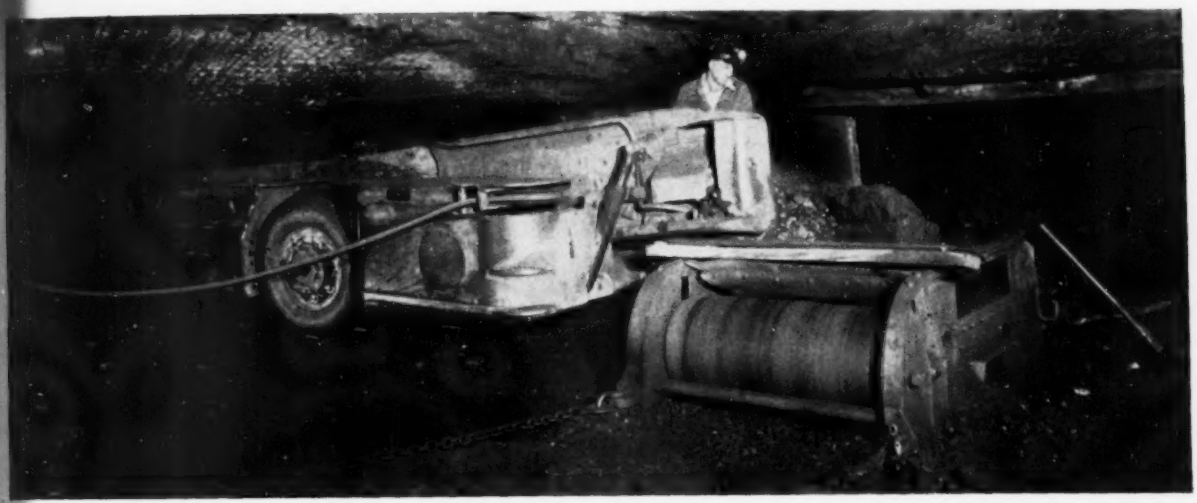

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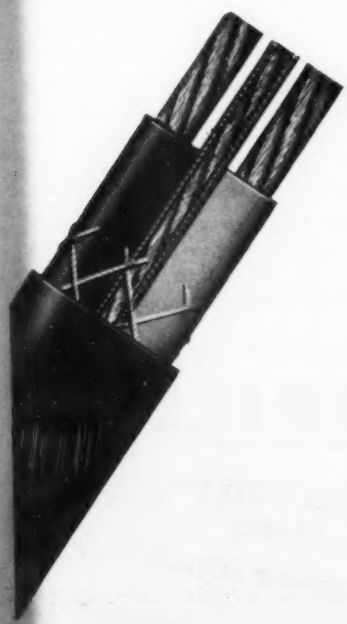

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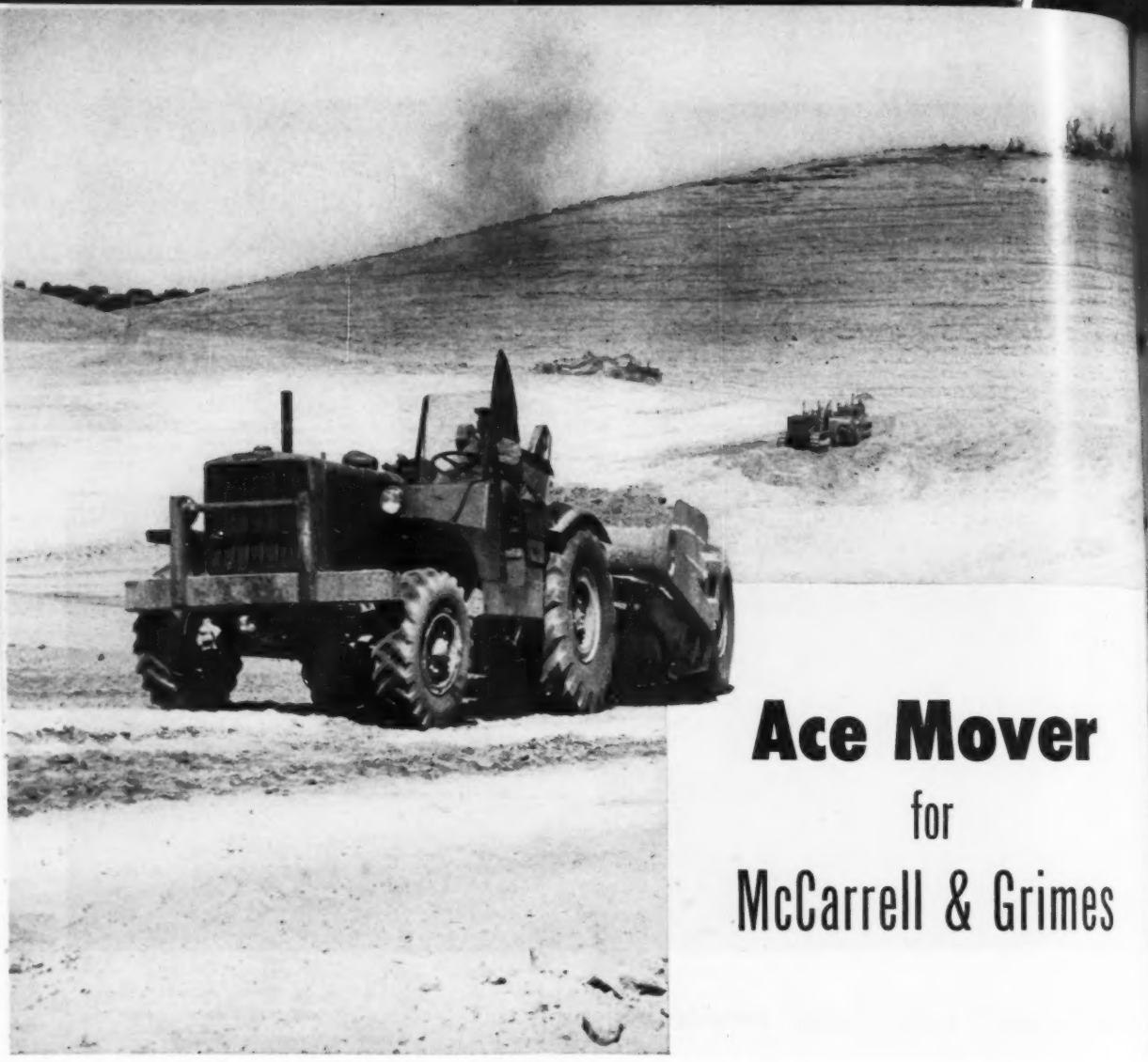

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ACTIVITIES OF INTERNATIONAL MINING MEN

B. JESSUP has been appointed assistant treasurer of Kennecott Copper Corporation. He resigned his position as vice president of Day Mines, Inc. at Wallace, Idaho, to assume his new duties of Kennecott's executive offices in New York City. He had practiced law for several years before entering the employ of the Day interests whose mining operations were consolidated into Day Mines, Inc. in 1947.

Harry Gerber, superintendent of plants for Zontelli Brothers in Minnesota for the past four years, is now employed in a similar capacity by Pickands Mather and Company. His first duties at Pickands Mather will include bringing the West Hill and Biwabik HMS plants into production. **Ted Zontelli** will take over his duties at Zontelli Brothers.

George S. Krueger, general superintendent of the Park Utah Consolidated Mines Company in Park City, Utah has resigned because of poor health. **E. A. Hewitt** has been placed in charge of operations at the Judge unit.

Louis D. Gordon, senior engineer for the Reconstruction Finance Corporation in Nevada, has been appointed executive secretary of the Nevada Mining Association.

C. H. Burgess has been appointed head of a new office for another Kennecott subsidiary, Bear Creek Mining Company. The newly-established exploration offices will be located at 3336 Republic Avenue, St. Louis Park, Minneapolis, Minnesota.

George C. Selfridge, former chief of the Defense Minerals Exploration Administration Iron and Ferro Alloys Division, is now special assistant to the administrator. **Willis R. Griswold** has been appointed chief of the Base Metals Division, replacing **Howard F. Keller**, who resigned to become general superintendent of the Naica unit of the Fresnillo Company at Naica, Chihuahua, Mexico.

Mining Association of Montana has elected **Ted E. Collins** of Helena president, succeeding **L. B. Manning** of Philipsburg.

W. S. PHILLIPS, has been appointed mine superintendent of the Holden mine operated by the Chelan Division of Howe Sound Company in Washington. Mr. Phillips had formerly been chief engineer of the mine. He has helped to develop the long-hole drilling system at the Holden, and has conducted engineering studies in the use of both diamond and carbide-tipped drill rods for long-hole drilling.

Uranium Ore Producers Association, which has headquarters in Grand Junction, Colorado, has also elected officers. They include: **W. E. Haldane**, president (third term); **T. H. Skidmore**, first vice president; **Howard Balsley**, second vice president; **Cato Sells** (Arizona), **Chester Wright**, **Walter Gramlich** and **Abe Day** (Utah), **T. W. Newell** (New Mexico), **Louis Gaggini**, **J. B. Crowley**, **Boyd Oliver**, **Senator Lew Williams**, **Garth Thornburg** (Colorado), **Clyde Boyle** (South Dakota), directors; **Jack O. Jones**, secretary-treasurer; and **Norman Ebbley**, engineer and shippers' representative.

Henry B. Fry is new Manager of the New York Operations Office, U. S. Atomic Energy Commission. Mr. Fry, former deputy manager, succeeds **W. E. Kelley**, who has resigned.

F. H. BUCHELLA, has been named plant manager and director of engineering for San Manuel Copper Corporation, a subsidiary of Magma Copper Corporation. He was formerly assistant manager of Kennecott Copper Corporation at Silver City, New Mexico.

Roy L. Lay of Houston, Texas and **Dr. Karl Dyk** of Tulsa, Oklahoma, were elected president and vice president, respectively, of the Society of Exploration Geophysicists. **Curtis H. Johnson** of Los Angeles, retiring president, also announced the appointments of **Bart W. Sorge**, San Gabriel, California, as secretary-treasurer, and **Milton B. Dobrin**, Dallas, Texas as editor.

William Belano is now chief project engineer in charge of mining for International Minerals & Chemical Corporation's Engineering Division. Mr. Belano has had over 16 years of mining experience in the United States and overseas, and was manager of the Marianna Division mines of the Pond Creek Pocahontas Company before joining International.

Horace M. McCoy has moved from "acting" to "actual" administrator of the National Production Authority, Department of Commerce. His appointment followed the resignation of **Richard A. McDonald**, who has returned to private business in San Francisco.

A. J. Rambosek, mining engineer, is acting chief of the new office opened by the U. S. Atomic Energy Commission at 614 Goodrich Building, Phoenix, Arizona. He formerly was stationed at Richfield, Utah.

Members of the Colorado Mining Association have elected the following officers for 1953. President, **Harrison S. Cobb**; first vice president, **Charles Chase**; second vice president, **Harold Worcester**; third vice president, **Edward Dickerman**; fourth vice president, **Mike Cloonan**; fifth vice president, **Everret Haldane**; treasurer, **H. W. C. Prommel**; executive vice president, **Robert S. Palmer**; and secretary, **Thelma A. Abel.**

ROY A. HARDY of Getchell Mines, Inc. has been named president of the newly reorganized Nevada Mining Association which changed its name from the Nevada Mine Operators Association. JOHN C. KINNEAR, JR., Kennecott Copper Corporation, has been named first vice president; PERCY G. DOBSON, Summit King Mines Corporation, is second vice president.

Gordon E. Dean has resigned as chairman of the U. S. Atomic Energy Commission. The vacancy caused by the unexpired term of **T. Keith Glennan** has not been filled as yet.

A. R. Wardle, Tonopah, Nevada businessman, is president of the newly-incorporated Argentite Development Corporation. Other officials are **Carroll Humphrey**, vice president; **Ray Hines**, secretary-treasurer; **Frank Murnane** and **Walter Ball**, directors. The corporation plans to develop the Mohawk mine of Bruhi Enterprises.

Carl W. Appelin is new regional engineer from the U. S. Atomic Energy Commission in the Carrizo-Lukachukai area of Northeastern Arizona. He is stationed at Cove School, Arizona.

William G. Brown, superintendent of the Mahoning mine of Pickands Mather and Company, and **A. E. Schneider**, superintendent of the Bennett mine, have retired. In addition, **Frank Fotchman** has retired from his position of superintendent of plant for Pickands Mather on the Mesabi Range.

T. C. Matthews is new chairman of the Oregon section, American Institute of Mining and Metallurgical Engineers. Mr. Matthews has been affiliated with the Oregon State department of geology and mineral industries for the past five years. **F. X. Cappa** of the Aluminum Company of America at Vancouver is new vice chairman, and **T. J. Waters**, Pacific Carbide & Alloys in Portland, is secretary-treasurer.

Raymond F. Robinson, chief geologist for Sunshine Mining Company in Shoshone County, Idaho, has accepted a position with the U. S. Geological Survey in Tucson, Arizona.

Edward J. Duffy has been appointed to the new post of manager of raw materials development for Kaiser

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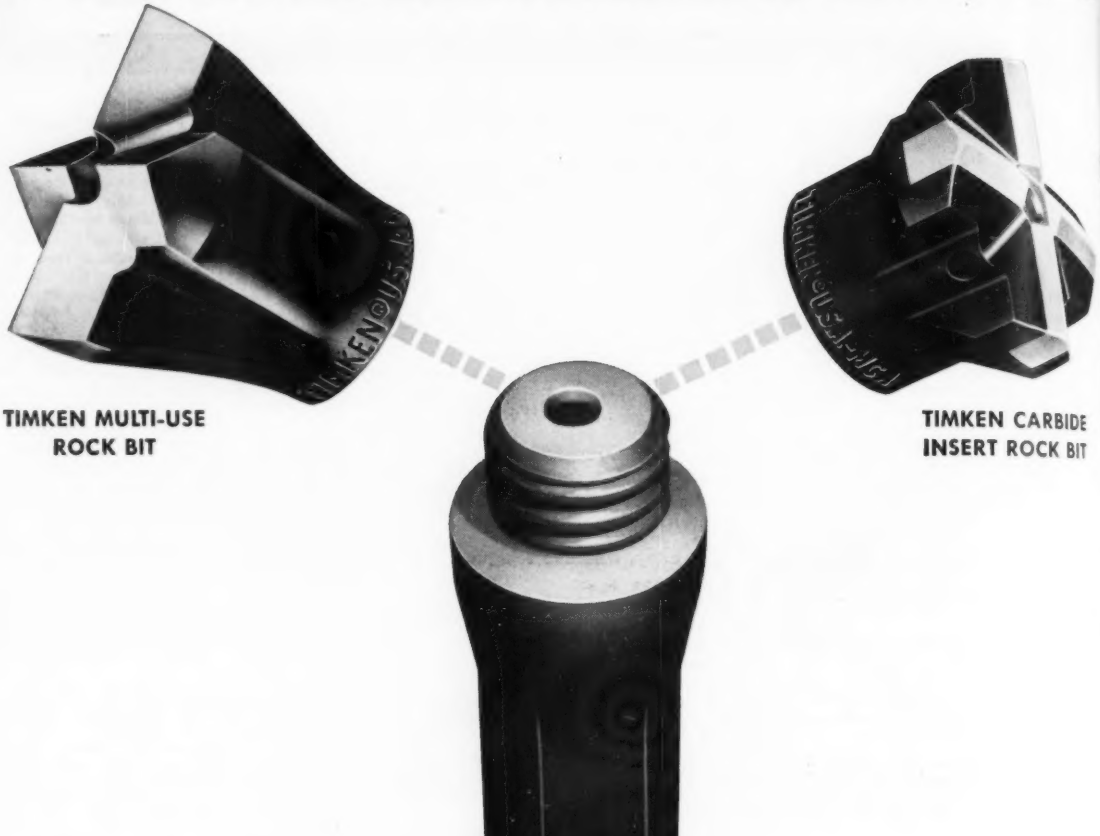

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ACTIVITIES OF U. S. MINING MEN

Professor E. Schumacher recently became affiliated with the Mineralogical Institute in Bonn, Western Germany.

Dale C. Mathews, formerly with The Galigher Company in Utah, has accepted the job of training supervisory personnel at Utah Construction Company's tungsten mines in Korea. Mr. Mathews has been in mining for the past 25 years, 16 years of them in supervisory capacities.

M. McKeown is new chief geologist with Rhodesian Asbestos, Ltd., in Mashaba, Southern Rhodesia. He was a geologist with Barclay's Bank in Nakura, Kenya, East Africa.

W. H. van Raadshooven has left Oruro, Bolivia and is now located at Waterige weg 50, Zeist, Holland.

Dr. J. Harlan Johnson has just returned to the geology department of the Colorado School of Mines after spending six months studying western Pacific reef islands for the U. S. army engineers. Dr. Johnson is a world authority on the building of limestones and their mineral content.

Mr. and Mrs. Andrew Nylund, pioneers in Alaska's Ester mining district, have left the territory permanently and will now make their home in Seattle, Washington.

Joseph F. Harrington has accepted a Point Four assignment to act as technical advisor on mineral resources development in Colombia and Ecuador. At the request of the two governments, Mr. Harrington will go to Bogota to assess mineralized areas and help determine which of the known mineral commodities should receive first consideration for exploration and development. He will also aid in the selection of young technicians for in-service and specialized advanced training in the United States.

Frank E. Delahunty, general superintendent of Baguio Gold Mining Company in the Baguio district, Philippine Islands, has resigned after 17 years with the company to return to the United States because of ill health. He is succeeded by **Robert Makan,** former mining superintendent of Itogon Mining Company.

W. D. Brookes has been appointed a director of Gold Mines of Kalgoorlie (Aust.) Ltd., Central Norseman Gold Corporation, N. L., and Great Western Consolidated, N. L. **J. Chester Guest** was also made a director of Great Western Consolidated, N. L. All are Australian firms.

Huseyin Kulaksiz, consulting mining engineer with Bakir Sanayii Sirketi, is now at Acikyol sok No. 4/1, Kurtulus, Istanbul, Turkey.

P. H. A. Zaalberg, mining engineer, formerly associated with the Nickel Processing Corporation in Cuba, is now in Surinam as general manager of the Billiton Company. **J. Bierling,** his predecessor, has been transferred to Southern Rhodesia, where Billiton has acquired the holdings of Kamativi Tin Mines.

MICHAEL D. DAVID has been appointed secretary of the Cerro de Pasco Corporation with headquarters in New York City. Mr. David, formerly assistant secretary, succeeds **ROBERT F. MITCHELL** who had been secretary and treasurer. Mr. Mitchell will continue as treasurer.

Dr. Harry V. Warren, professor of geology at the University of British Columbia, was re-elected president of the British Columbia and Yukon Chamber of Mines. **S. J. Crocker** and **Henry L. Hill** are vice presidents, with **Frank E. Woodside** continuing as manager.

Benjamin F. Fairless, president of United States Steel Company, recently was in Venezuela to confer with **Colonel Marcos Perez Jimenez,** provisional president, on the development of Venezuela's iron ore deposits. President Perez Jimenez also requested aid in establishment of the country's first steel mill.

Olov H. Odman has been appointed professor of geology at the Royal Institute of Technology, School of Mines, Stockholm, Sweden. Mr. Odman was with the Geological Survey of Sweden, and has been a field geologist in East Africa, Europe and Ireland.

V. Gorsky is new manager of the Illovo Beach, Natal, South Africa ilmenite-rutile-zircon pilot plant of the Titanium Corporation of S. A., Ltd.

John R. Bogert is now a geologist with the Kennecott Copper Corporation in Lima, Peru.

H. A. Steane has left Mount Morgan Limited, Queensland, Australia, and is now a metallurgist with Canadian Exploration Limited at Salmo, British Columbia, Canada.

J. B. Stapler, mines division manager for Marsman and Company, Philippine Islands, is returning to the United States because of poor health.

The Witwatersrand University Mining Engineers' Association has been founded in South Africa and officers are **C. Biccard-Jespe,** patron; **H. Clark,** chairman, **J. G. Freislich,** honorary secretary-treasurer; **H. H. McGregor, G. J. J. Haumann, V. C. Robinson, A. R. Louw,** and **R. C. Gorges,** committee members. The new association was organized to provide a direct link between the mining profession and the university faculty.

Bjon Jarnefors and **Gunnar Kautsky** have been appointed geologists at the Swedish Geological Research Society.

Charles W. Jeffers has tendered his resignation as executive secretary of the International Materials Conference, and **J. Hubert Penson** of the British Embassy in Washington, D. C., will succeed him.

G. C. Lindesay Clark is new chairman of the board of directors of Gold Mines of Australia Limited, succeeding the late **Sir Walter Massey-Greene. Harry Hey** takes Sir Walter's place as chairman of the board of Electrolytic Zinc Company of Australasia, Ltd.

Ragnar Sunden, director of the Swedish Industry Association, has been appointed director of the Jernkontoret (Chamber of Iron), succeeding **Gosta Risell,** who has retired.

G. V. R. Richdale is now associated with **C. W. Engelhard** in the direction and administration of Engelhard Industries, a precous metal group. Mr. Richdale is also a director of Transvaal Gold Mining Estates, Ltd., Union of South Africa.

John McMath, formerly with the Geological Survey of Western Australia, is now chief geologist for Bureau de Minier de la France, Tananarive, Madagascar.

South African Minerals Corporation, Ltd., has reconstituted its board of directors to include the following: **J. H. Furman, Mrs. S. C. Furman, C. D. Tudhope, M. Knowles, W. Sandwell, A. Tomaselli, G. Schaffer,** and **E. W. Bayliss.**

S. G. Salamy, recently awarded his Doctor of Philosophy degree by the University of Melbourne, is now a technical assistant with King Island Scheelite (1947) Ltd., King Island, Tasmania.

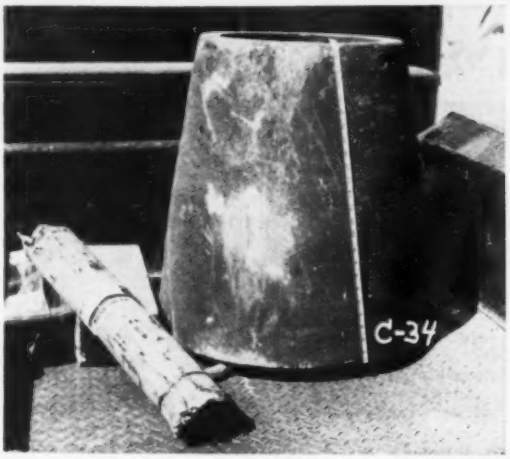
Two engineers who left Bolivia recently are **H. Van Raadshoven,** mill superintendent of the Machacamarca mill of Empresa Minera San Jose at Oruro, and **Walter Meckel,** mill superintendent of Compania Unificado del Cerro de Potosi. Mr. Van Raadshoven is a Dutch citizen and Mr. Meckel a United States citizen.

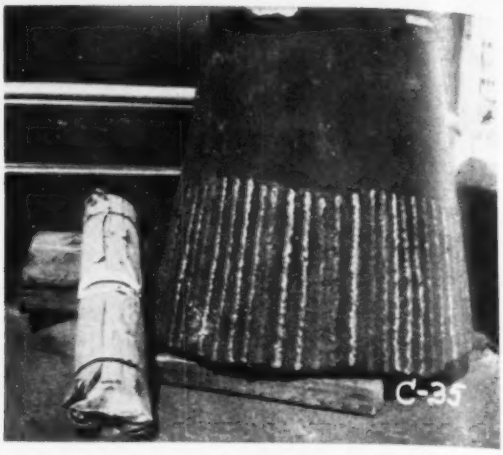
S. B. Dickinson, South Australian Director of Mines, is now president of the Adelaide branch of the Australasian Institute of Mining and Metallurgy.

Charles Will Wright, Washington, D. C., consulting mining engineer, has been in Mexico doing consulting for Impulsora Minera de Mexico, S. A.

H. H. Carroll, former managing director and general manager of Wiluna Gold Mines Ltd., Wiluna, Western Australia, has been appointed a consultant to Mount Isa Mines Ltd., Mount Isa, Queensland.

ALFRED O. QUINN, new president of the American Society of Photogrammetry, heads the Engineering and Field Surveys Divisions of Aero Service Corporation. Previous to this, Mr. Quinn had been associate professor of Photogrammetry at the University of Syracuse, and in 1946 was assistant to the director of photography for the atom bomb tests at Bikini.





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INTERNATIONAL NEWS

Indonesia Nationalizes Tin Mining on Bangka

More than 100 years of Dutch tin mining on Bangka Island came to an end on February 28 when G. L. Bol acting on behalf of the N. V. Billiton Maatschappij and Gemeenschappelijke Mijnbouw Maatschappij Billiton companies transferred control of mining to G. Bratakusumah, Indonesian government engineer, who will be in charge of mining. The Dutch companies had operated the mines under a concession.

Meantime, discussions are underway in regard to mining on Billiton Island. One government proposal is to award Billiton a concession contract for five years during which time the Indonesian government could make preparations for nationalizing the mines.

Inland Steel Subsidiary To Mine Steep Rock "C"

Caland Ore Company, Ltd., a subsidiary of the Inland Steel Company, has taken a 99-year lease on 1,200 acres of land containing what is known as the Steep Rock "C" orebody from Steep Rock Iron Mines, Ltd. The properties are located at Steep Rock Lake, 140 miles west of Port Arthur, Ontario, Canada.

Inland has had an option on the property for several years and exploratory drilling has been carried out for the last three years. Drilling has indicated 50,000,000 tons of ore, some of which is high grade—up to 64 percent iron.

Caland plans to spend $50,000,000 to develop the deposit and bring it into production. Shipments are scheduled to start in 1960 at the initial rate of 750,000 annual tons. By 1969 shipments should be increased to 3,000,000 tons yearly.

Isle of Pines to Reopen As Caribbean Gold Mines

Reorganized as the Caribbean Gold Mines, the old Isle of Pines gold mining property in Cuba is to be reopened for production. A commitment for a $300,000 loan has been obtained from the Cuban Banco de Fomento provided an additional $250,000 can be raised. Over half of the latter sum has been assured through Transcontinental Resources Ltd., and the balance is expected to be forthcoming shortly.

A 900-kw. Diesel power plant has been constructed on the property by the Cuban government and power will be available to the company at the cost of producing it. A one and a half month unwatering program, followed by general rehabilitation, is expected to be the first step before development can begin. Development, stope preparation, and actual production are expected to cost about $531,500, and it is for this aspect of the project that the extra money is needed.

Argentine 5-Year Plan For Mineral Expansion

The Argentine national government will encourage increases in mining production as part of its new 1953 to 1957 plan. $240,000,000 will be assigned to supply mining equipment, to install regional plants for mineral recovery, and to finance topographic and mining surveys.

Specifically, the financial help of the national government during this period has been allocated as follows: $4,000,000 for Brucite [$Mg(OH)_2$] deposits; $500,000 for sulphur deposits; $6,000,000 for 19 copper mines; $6,000,000 for 17 tin mines; $10,000,000 for five iron mines; $3,000,000 for nine manganese mines; $25,000,000 for 25 gold mines; $6,000,000 for 30 lead-zinc-silver mines; $6,000,000 for 15 wolframite mines; $1,000,000 for three arsenic mines; $2,000,000 for six bismuth mines; $1,500,000 for two magnesium plants; $2,500,000 for six antimony mines; $2,000,000 for five chromium mines; and $2,000,000 for three nickel mines.

The national output is expected to reach these annual goals: sulphur 40,000 tons; manganese 9,000 tons; lead concentrates 70,000 tons; zinc concentrates 90,000 tons; wolframite concentrates 5,000 tons; arsenic concentrates 2,500 tons; barite 32,000 tons; kaolin 35,000 tons; magnesium 3,000 tons; and talc 17,000 tons.

Domestic Lead-Zinc Market Hard Hit By Low Prices

As foreign lead and zinc ore, a great deal of which was dumped on the world market by the British Ministry of Materials, reached the United States, the price for zinc has been driven down to 11 cents per pound and to 13 cents for lead.

The results has been catastrophic to the domestic zinc-lead industry. Many of the larger producers are managing to keep mines open despite daily losses runing into the thousands of dollars. Every segment of the industry has been hard hit from Tennessee to Washington, and from Idaho to New Mexico.

Among the important mines closed are the Ground Hog of the American Smelting and Refining Company at Vanadium, Grant County, New Mexico. It was one of the most important mines in the state and normally produced 15,000 tons of zinc and 2,500 tons of lead annually. Also in Grand County, the Empire Zinc Division of New Jersey Zinc Company has closed its Hanover mine and 300-ton mill.

In Colorado's San Juan, the Shenandoah-Dives stopped mining after successful production of over 4,000,000 tons of ore with a record of operations throughout the depression. King Lease, Inc. closed the Camp Bird mine near Ouray after 28 years of steady production. Callahan Zinc-Lead Company closed its Akron unit in Gunnison County down tight.

In Tennessee. the American Zinc, Lead and Smelting Company shut down its Jarnigan mine which had been producing about 3,600 tons of zinc per year.

Producers in the Tri-State district cut payrolls and wages to keep the larger mines operating, but the Helen H. Mining Company shut down its six Oklahoma and Kansas mines and the W. M. & W. Mining Company closed its Picher, Oklahoma mine and Baxter Springs, Kansas mill.

Among those companies curtailing production are the Bunker Hill and Sullivan Mining & Concentrating Company which stopped block caving operations and tailings reclamation at its mine in Idaho. Also in the same district, Day Mines, Inc. stopped mining in two zinc stopes in the Tamarack mine.

The Flux mine of the American Smelting and Refining Company near Patagonia, Arizona cut its work week to five days.

Smelters, too, have been adversely affected. At Monterrey, Mexico the American Metal Company, Ltd. reduced lead smelting by 33 percent. At Fort Smith, Arkansas, the Athletic Mining and Smelting Company cut zinc production 20 percent at its retort plant.

Rum Jungle Deposits May Be Center Of Larger Belt

Basing their opinions on aerial surveys, Australian government geologist now believe that the original Rum Jungle uranium discovery may be in the middle of the largest uranium belt in the world. The belt apparently runs from near Darwin through Rum Jungle to about 30 miles south of Katherine, a total distance of 300 miles.

Ground parties are now checking the aerial surveys, and more information should be forthcoming soon.

Mr. Beale, Australian Minister for supply, said that the government would have to decide in the very near future whether to disperse its present resources over a number of discoveries or to concentrate on the full development of one. Apparently the authorities are anxious to "declare" most of the area south of Darwin as uranium fields, fearing that prospectors may be withholding information of uranium discoveries.

Beach Sand Minerals To Be Recovered In S. Africa

The Titanium Corporation of S. A. Ltd. has started construction of a large pilot plant to recover ilmenite, rutile, and zircon fron ancient beach sands along the east coast of South Africa. The plant is being built at Illovo Beach, Natal, South Africa. Humphreys Spirals will be used to make a bulk gravity concentrate which will be dried and the ilmenite removed by a magnetic separator. The tailing will be treated by electrostatic machines to recover the rutile and zircon.

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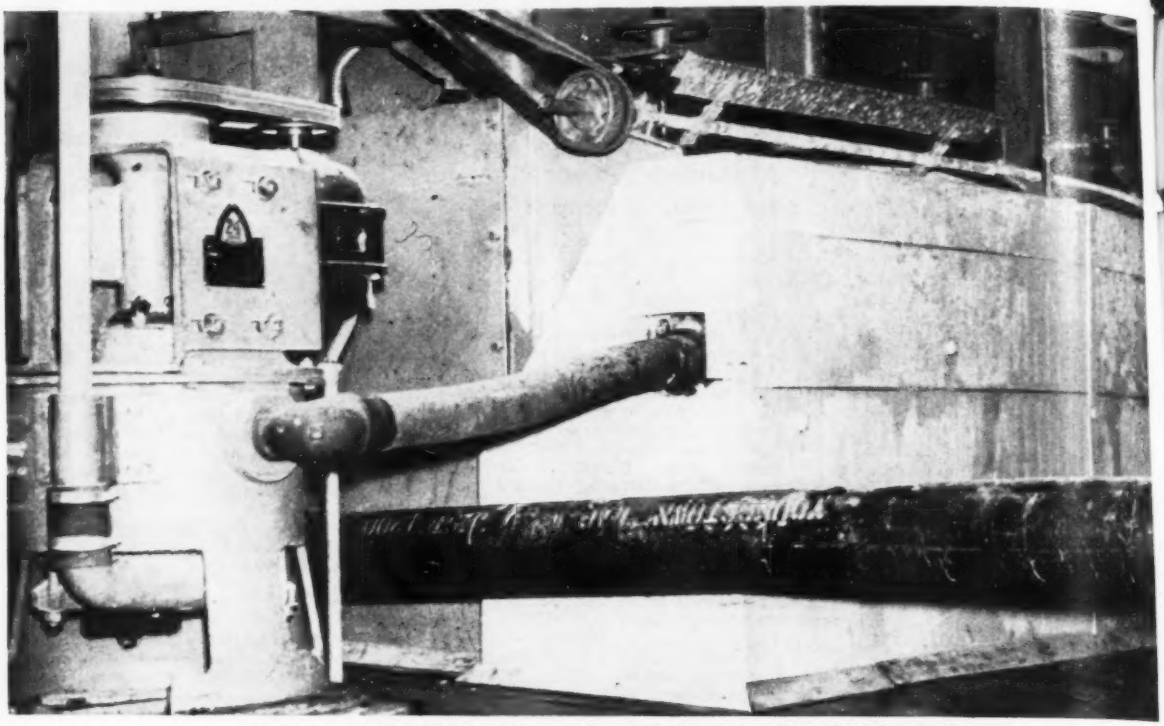

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AFRICA

UNION OF SOUTH AFRICA—Work is progressing satisfactorily in the opening up of the high-grade hematite iron ore deposit of the *South African Iron and Steel Industrial Corporation* on the farm Sishen, Kuruman district, in northern Cape Province. The ore will be extracted by open-pit mining. A crushing and screening plant capable of handling 500,000 tons of ore initially per annum is being installed. Still under construction is a rail line to Sishen from Lohathla Station. Initial shipments of ore by rail are expected by the middle of the year.

BELGIAN CONGO—Production of gold for the first eleven months of 1952 at the *Kilo-Moto* mines operated by the *Societe des Mines d'Or* totaled 61,500 ounces (contained in 249 fine bullion and sponge) as compared with 87,400 (contained in 397 fine bullion and sponge) in the same period of 1951.

UNION OF SOUTH AFRICA—The £2,000,000 phosphate plant being sponsored by the government at Palabora is expected to go into operation about the middle of next year. Initial production will be about 56,000 tons of phosphate concentrate annually, but plans call for doubling of production to 112,000 tons and later to 450,000 tons a year. The plant is expected to be able to supply all of South Africa's phosphate requirements. Progress has been made with the erection of the first dwellings, buildings, and model town. An agreement reportedly has been signed with a German firm, *Gutehoffnungshutte*, for the construction of a portion of the concentrate-unit, while provision has been made for the erection of an electric power station capable of producing 2,500 kilowatts.

NORTHERN RHODESIA—*Mufulira Copper Mines Ltd.* reports that for the six-month period ended December 31, production of blister copper totaled 37,662 long tons. Sales value of 36,162 long tons was £8,697,000; estimated profit was £4,734,000. During this same period, *Roan Antelope Copper Mines Ltd.* reported an output of 37,837 long tons which brought a return of £9,099,000. Estimated profit was £4,810,000.

FRENCH GUINEA—*Compagnie Miniere de Conakry* has made its first shipments of iron ore to Belgium. Initial shipments will be about 25,000 tons annually, but this will be increased to 100,000 tons later. The company was established with French and United States funds.

UNION OF SOUTH AFRICA—*Anglo American Corporation of South Africa Ltd.* will subscribe at par for £5,500,000 of registered unsecured notes in the *Loraine Gold Mines Ltd.* Of this amount, £3,500,000 will be subscribed immediately and the balance on January 1, 1954. The money will be used to repay existing loans (including about £2,780,000 presently owed to the corporation) and to finance operations to the end of 1953. An additional option, if exercised, will bring another £3,437,500 which, with limited temporary borrowing facilities, will be sufficent to bring the mine to production at 75,000 tons per month. No. 1 shaft has now reached a depth of 5,470 feet, and level development has begun. In the No. 2 shaft (which had reached a depth of 3,878 feet in January), intersection of the Basal Reef is expected during the second quarter of this year. Milling on a small scale and metallurgical and plant tests are expected to start in the second quarter of 1954. A rate of 50,000 tons per month should be reached during the fourth quarter of 1954, with the intention of increasing this to 100,000 tons as soon after that as possible.

GOLD COAST—*Ashanti - Andoscna (Banket) Goldfields Limited*, operating at Western Akim, has been liquidated and the property abandoned.

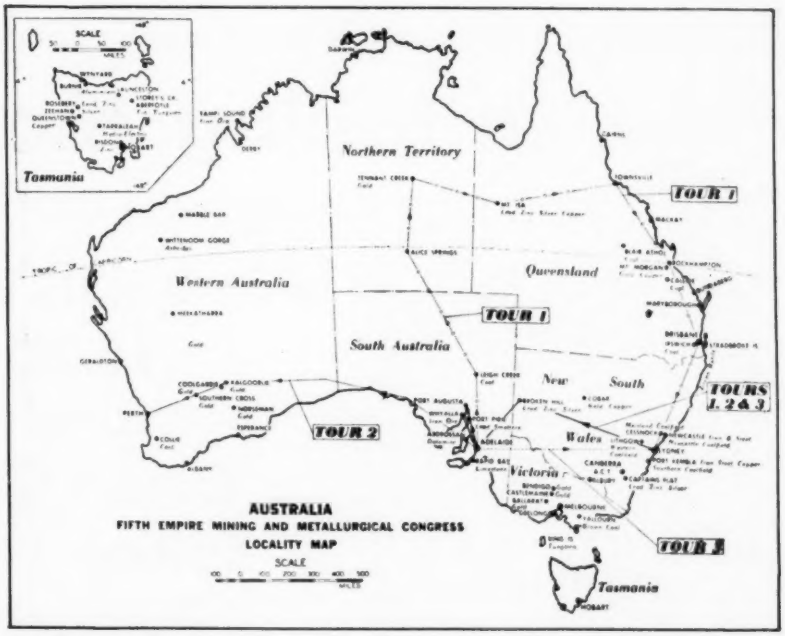
UNION OF SOUTH AFRICA—*Harmony Gold Mining Co., Ltd.* is proceeding with the erection of a plant to extract uranium from the residue slimes of its gold production plant. Arrangements have been made with the Atomic Energy Board of South Africa whereby loans will be obtained to meet the capital cost. The plant is expected to be ready for production in the last half of 1954 when it is expected that gold production will begin. The contract with the Atomic Energy Board is for 10 years, and is similar to agreements made with other mining companies for uranium extraction. The acid-producing unit and the uranium leach plant of *Daggafontein Mines Ltd.* are nearing the final stages and production is expected within the next few months.

NORTHERN RHODESIA—Increases have been granted in the wages of African mineworkers, retroactive to November 17, 1952, when arbitration was agreed to by the African Mineworkers Union. The original increase sought by the Union was 2s 8d per shift in the basic pay of all classes or groups of miners. The increase awarded ranges from 1s,2d to 1s 8d for the various groups.

SOUTHERN RHODESIA—A majority holding in the *Kamativi Tin Mines* has been acquired by the Dutch tin firm, the *Billiton Company*. A program for intensive exploration of Kamativi's tin concessions is being planned.

OCEANIA

WESTERN AUSTRALIA—*Great Western Consolidated N.L.* at Bullfinch produced 3,377 ounces of gold for the four weeks ended January 7. Monthly produc-



AUSTRALIA
FIFTH EMPIRE MINING AND METALLURGICAL CONGRESS
LOCALITY MAP

MINING CONGRESS MEETS IN AUSTRALIA

The Fifth Empire Mining and Metallurgical Congress will meet in Australia from April 12 to May 23, 1953, and subsequently in New Zealand. Organized by a number of technical institutions connected with the mineral and metal industries, the Congress held its first meeting in 1924. Its chief object is to give mining engineers, metallurgists, scientists, and others interested in the mining and metallurgical industries an opportunity to meet and discuss technical progress and problems, including the development of the mineral resources of the British Commonwealth of Nations. The program includes a pre-sessional visit to Tasmania; business meetings in Melbourne and technical sessions in Sidney; a visit to Canberra, seat of Australia's Commonwealth government; and alternative excursions to mining and metallurgical centers (note the routes of these tours as indicated on the map above.) President of the Fifth Congress is Essington Lewis, C. H.

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tion appears to be settling near the figure of 3,500 ounces. In the same four weeks, the mine of *Norseman Gold Mines, N.L.*, produced 6,417 ounces of gold. This is 700 ounces higher than recent monthly output. The company operates at Norseman, treating about 150,000 tons per year for 50,000 ounces of gold and a slightly smaller output of silver. Also at Norseman is the mine of *Norseman Gold Mines, N.L.*, important producer of pyrite. Present throughput of ore is 6,500 to 7,000 tons of "average" ore and 1,000 tons of selected ore. Average ore is treated by flotation; selected ore is crushed and railed without treatment. Ore floated is about 23 percent sulphur, yielding a concentrate assaying about 46 percent sulphur. Selected ore averages about 33 percent sulphur. Ore reserves are estimated to be 3,706,000 tons at 25 percent S. A plant is being installed to increase pyrite output to 20,000 tons monthly.

PHILIPPINE ISLANDS—The new Sta. Monica ore shoot at the *San Mauricio Mining Company* property in the Paracale mining district has now been developed for a length of 450 feet with an average width of 3 feet and values running up to Pesos 200 per ton. A crosscut at a lower elevation is scheduled to reach this vein shortly. Meantime, in the north extension of this same vein on the 500-foot level a drift has opened a 12-inch vein averaging two to three ounces gold per ton.

NORTHERN TERRITORY—Excessive monsoonal rain has held up production at many mining centers. *Falcon Gold Mines N.L.* and *Red Terror Gold Mines N.L.* (registered in Adelaide, S.A.) were forced to cease crushing scheelite ore at Mosquito Creek during January. *Peko (Tennant Creek) Gold Mines N.L.* has also reported delays in dispatching high-grade copper-gold ore to the smelter at Port Kembla, New South Wales. However, the wet season should make sufficient water available for continuous crushing operations at *Spring Hill Gold Mines N. L.* where operations had been delayed earlier in the year because of severe drought. The company's leases are on the Darwin-Birdum railway 128 miles south of Darwin.

FIJI ISLANDS—The *Emperor Gold Mining Company Ltd.* reports that in 12 recent weeks, the company treated 30,312 tons of ore for a recovery of 10,223 ounces of gold.

NEW ZEALAND—The *Arahura Gold Dredging Ltd.* of Arahura treated 102,000 yards of gravel during the first half of February for 302 ounces of bullion. *Kanieri Gold Dredging Ltd.* at Kanieri treated 109,000 yards during the same period for a return of 286 ounces of bullion.

QUEENSLAND—Production of silver-lead bullion at *Mount Isa Mines Ltd.* which last year showed a considerable increase over the previous year, has still further improved in the six months ended December 31. For the year ended June 30, 1952, 36,602 tons were produced; for the half year ended December 30, 19,140 tons were produced. Copper mining by small producers in this state may be stimulated by the new Mount Isa copper smelter. Producers as far away as Alice Springs, Northern Territory, are exploring the possibility of bulk shipment to Mount Isa. As the Mount Isa blister will be fire-refined, the smelter will be of little assistance to producers who have associated gold.

PHILIPPINE ISLANDS—Development of ore in the south extension of the Longo vein and the increase in the January production to a total of Pesos 232,416 indicates a favorable outlook for *United Paracle Mining Company.*

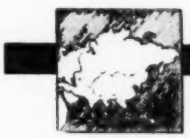
NEW GUINEA—*New Guinea Goldfields* reports that during January its Golden Ridges mill treated 2,785 tons of ore for the recovery of 1,262 ounces of bullion. During the month, Edie Creek alluvial workings produced 149 ounces of bullion and Koranga alluvials produced 589 ounces.

TASMANIA—In four weeks ended January 7, the *Electrolytic Zinc Company of Australasia Ltd.* produced 13,067 tons of ore from its west coast mines near Rosebery. This yielded 720 tons of lead concentrate, 3,469 tons of zinc concentrate, and 300 tons of copper concentrate. Lead and copper concentrates are exported for treatment but zinc concentrate is roasted, leached, and electrolytically refined at Risdon, near Hobart. The Risdon plant also produces electrolytic zinc from a portion of the concentrate received from Broken Hill, New South Wales.

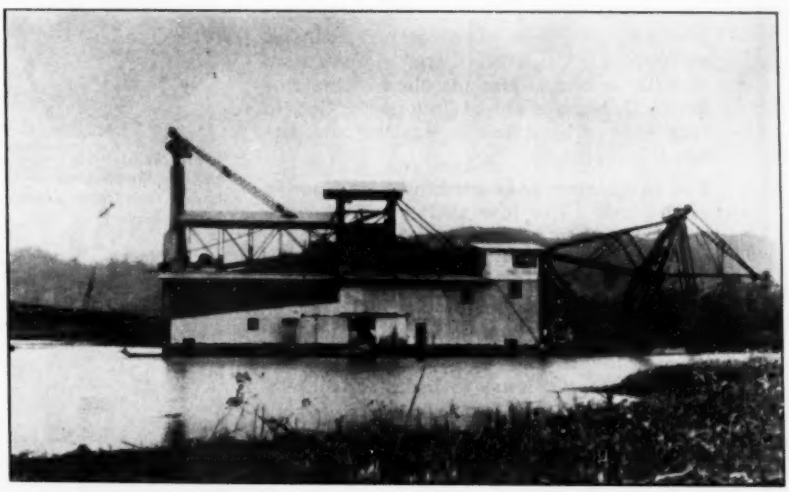
NORTHERN TERRITORY—Any further drop in the price of wolframite may cause many miners to leave the wolframite fields, the largest of which is Hatches Creek. The price of a bag of concentrate is now £A65, compared with £A100 a year ago, and costs have increased.

VICTORIA—Gold yield by *Morning Star (G.M.A.) Mines N.L.*, at Woods Point has improved greatly during recent weeks. Output per month is about 1,450 ounces from 1,600 tons of ore. The *Deborah* mines of *North Deborah Mining Co. N.L.* and *Central Deborah Gold Mining Co. N.L.* continue in production at Bendigo. Recent output from Central Deborah amounted to 86 ounces per week from 220 tons of ore. Like all the small low-grade mines, rising costs and near-fixed prices for gold are making operations difficult.

NEW SOUTH WALES—*Wellington Alluvials Ltd.* at Wellington (controlled by *Broken Hill Pty. Co. Ltd.*) is again digging through lower grade ground. Output in January from 364,000 cubic yards treated was only 771 ounces fine gold. In November, 325,000 yards yielded 1,154 ounces. With costs at 11.01 pence per yard, the company is reportedly not even paying its way.



INDIA—The government is said to have decided to drop the proposed project for a joint Japanese-Indian iron and steel plant near Calcutta. The news reportedly came as a surprise and sharp disappointment to Japan, and particularly to three Japanese firms which were to have taken part in the project. According to K. C. Reddy, Indian Production Minister, the government had decided that it did



COCO GROVE DREDGES THE PARACALE

Coco Grove Inc.'s dredge, the "Mary Angus," is currently in operation on the upper Paracale River near Paracale, Camarines Norte, in the Philippine Islands. (See photogaph above). The 5,000-yard-daily-capacity, connected bucketline dredge is one of Marsman and Company, Inc.'s operations. It works the rich gold placer ground in the vicinity of the vein system of the United Paracale Mining Company. Yardage and production recovered in January were down slightly when compared with December output, but the dredge is expected to soon be in rich placer ground where values will be much higher. In January the company dredged 148,000 cubic yards for a recovery of 303,313 ounces of gold valued at Pesos 34,342.59. In December, the company had dredged 158,000 cubic yards to recover 473,239 ounces of gold valued at Pesos 51,170.90.

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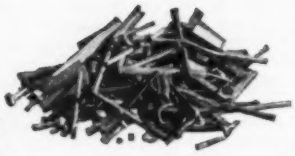

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not want the overall charge and control of basic industry like iron and steel handled by foreign interests. However, subsequent reports state that the Indian government has now asked Great Britain for assistance in setting up a steel plant. Here it is declared that negotiations with Japan failed because Japan was not prepared to take financial risks in the venture.

TURKEY—An iron ore deposit found several years ago around Erdremit near the Aegan Sea is now believed large enough to justify the erection of blast furnace facilities at Akcay. The Ministry of Economy had planned to erect these facilities if proven reserves of ore were more than 15,000,000 tons.

PAKISTAN—A sulphur-refining plant is to be set up in Quetta shortly, and to go into production early next year. The Pakistan government has given permission to *Messrs. Nasir Trading House Ltd.* to set up the plant which is expected to meet the urgent demand for sulphur in the country. Construction is expected to start in June, with machinery and technicians coming from West Germany. The output will be about five tons daily at first, increasing later.

INDIA—Notices have been issued by the Revenue Department of the Government of Orissa to the lessees of four chromite and four iron mines of Sukinda Estate, terminating their leases. Sukinda Estate was released from the Court of Wards on April 9 of last year, and thereafter vested in the Orissa government.

MALAYA—Tin production during the fourth quarter of 1952 totaled 14,542 tons of fine tin. European-owned mines produced 8,665 tons or 59.9 percent of the total, while Chinese-owned mines produced 5,877 tons, or 30.4 percent. The different mining methods employed produced as follows: dredging 7,375 tons; gravel pumping 5,631 tons; hydraulicking 422; dulang washers 238; underground 602; open pit 227; and miscellaneous 47 tons.

JAPAN—Production of electrolytic copper, lead, and zinc in October, November, and December was as follows: electrolytic copper, 71,631, 7,338, 6,718 short tons; electrolytic lead, 1,647, 1,618, 1,597 short tons; electrolytic zinc, 4,419, 4,099, 4,138 short tons.

INDIA—High-grade iron ore deposits have been reported near Kandla, Kutch. Further prospecting is being conducted to investigate the workability and commercial possibility of the deposits. Investigations are also going on in Saurashtra where high-grade lead and iron ore deposits have been reported.

THAILAND—*Tromal Prospecting, Ltd.*, formed to investigate an area off the coast of Tongkah, has met with encouraging results. One area has been proved to contain payable tin values, and application has been made for the issue of mining leases. While the application is pending, the question of equipping the area is now being considered. Prospecting over adjoining areas covered by prospecting licenses is continuing. *Malayan Tin Trading, Ltd., Southern Malayan Tin Dredging Ltd.*, and *Tronoh Mines Ltd.* are associated in the Tromal group.

TURKEY—Preparations have been made and submitted to the National Assembly by the Turkish government recommending the opening of a Bank of Mines to give financial aid to the mining industry and individual miners.

PAKISTAN—An iron ore deposit has been discovered near Drosh in Chitral. At the request of the *Pakistan Industrial De-*

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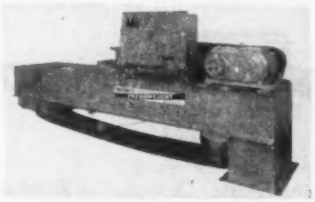

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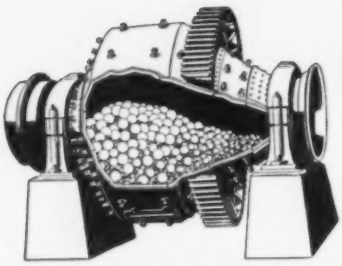
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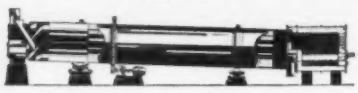
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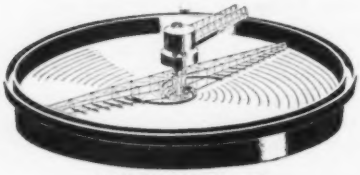
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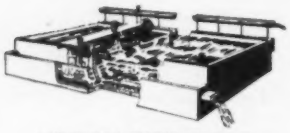
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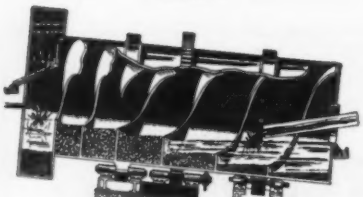
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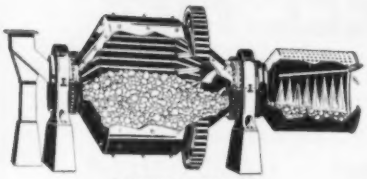
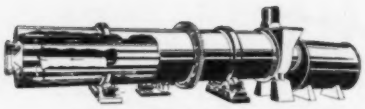
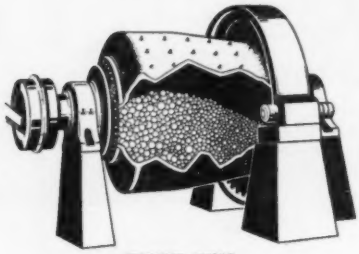
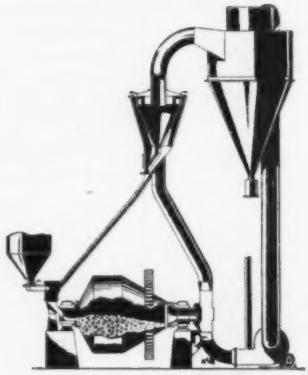
HEAVY-MEDIA SEPARATORS


CONICAL SCRUBBERS

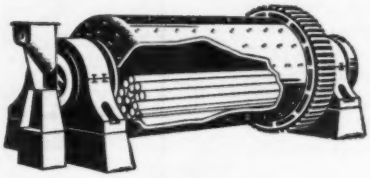
ROTARY COOLERS

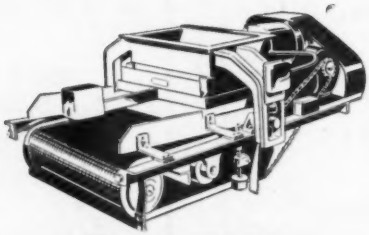

DOUBLE-SHELL ROTARY DRYERS


TRICONE MILLE


AIR CLASSIFYING SYSTEMS

ROTARY AND SHAFT KILNS


ROD MILLS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velopment Corporation, a ...rman firm made laboratory tests of ore ...mples and said that the quality of ir... was good. Investigations are now being ...ade to determine the extent of the de...it. If large enough, the latest German ...method of smelting iron ore in electri...l furnaces will be adopted and put int... use.

INDIA—The second shipm...t of ilmenite from Bombay State was m...de in February of this year. The last o... was made in 1951. The three lessees who have been granted mining leases for ilmenite in the Ratnagiri District have started development work by constructing roads and providing other facilities for mining and transporting the ore. A Bombay firm is reported to be setting up a concentration plant about 25 miles from Bombay to treat low-grade ilmenite deposits. The ore is of 35 to 45 percent grade and it is proposed to upgrade it to 50 to 55 percent TiO_2 and export the concentrate.

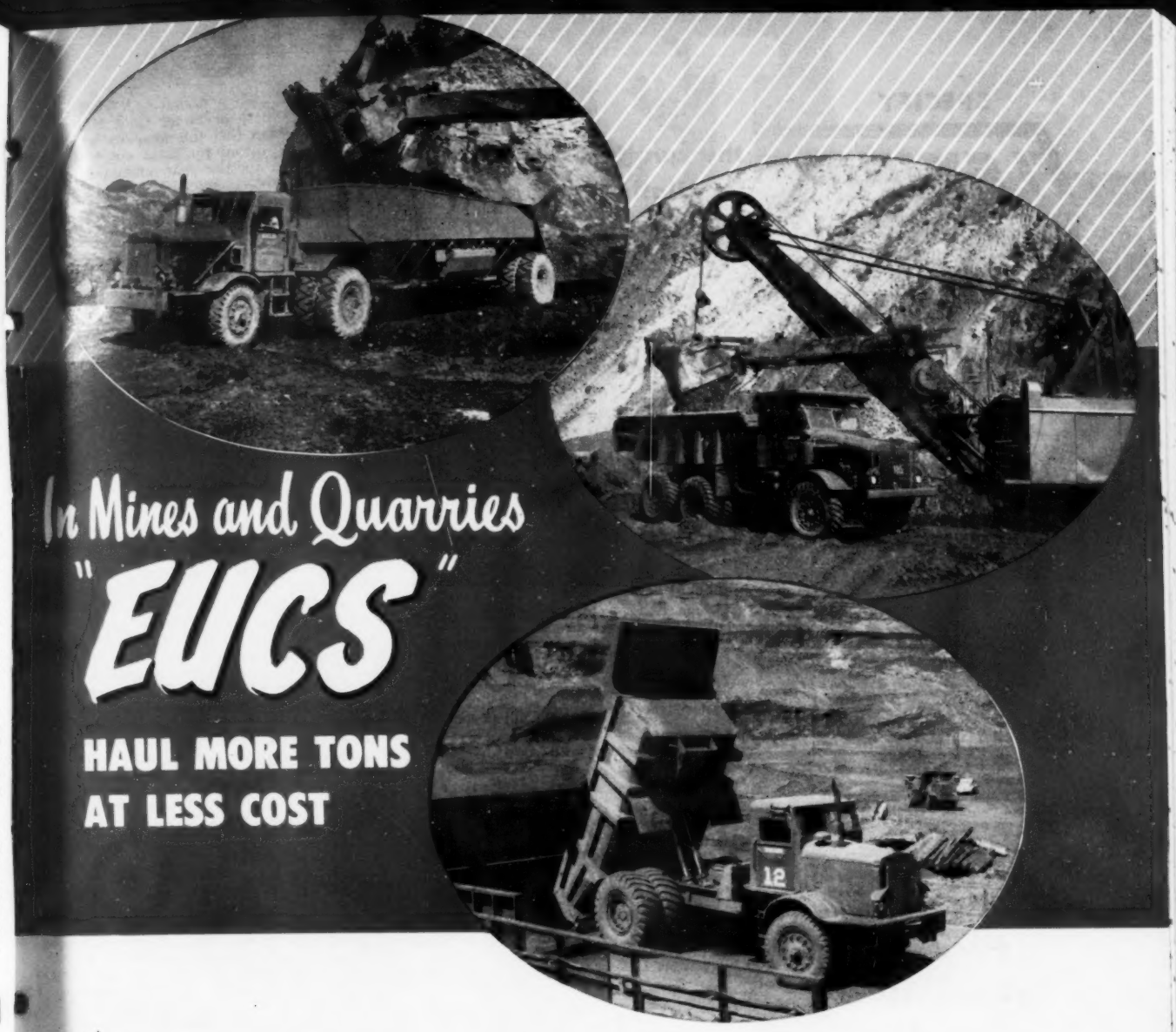
TURKEY—Many small deposits of lead, zinc, and copper have been found along the Turkish shore of the Black Sea but so far none have been large enough to justify commercial processing. Individual miners are mining and selling these ores, and also manganese ores, in comparatively small tonnages. Inland from the Black Sea, a large deposit of sheet white mica has also been found. It will not be worked for about a year, however, until a state road is constructed near the mine.

CHINA—According to the official organ of the Chinese government, the *Peking People's Daily*, China has failed to fulfill her overall steel and iron production goals in the first month of her Five-Year Plan. The situation is viewed as serious.

INDIA—The *Central Provinces Syndicate Ltd.* recently purchased an Atlas Diesel portable air compressor with rock drills for use at its *Chaukhandi* manganese mines in the Bhandara district. The Syndicate hopes to increase its output by four times the present amount when the air compressor is put into operation.

MANITOBA—Diamond drilling for uranium by *Cyprus Exploration Corporation* at Dion Lake 12 miles northeast of Herb Lake post office has showed little mineralization, according to reports. Twelve holes have been drilled on the 300-claim group. Future plans call for surface prospecting and checking of surface outcrops. Cyprus Exploration is a subsidiary of *Cyprus Mines Corporation* with headquarters in Los Angeles, California. Harvey Mudd is president.

QUEBEC—*The Aluminum Company of Canada* shipped 33,000,000 pounds of aluminum to the United States during February and March to help offset domestic losses caused by the recent power shortages in the northwestern part of the U.S. In addition, a "repayment" of 11,000,000 by the U.S. to Canada for aluminum previously borrowed was postponed until 1954 or 1955. In effect, this boosted the U.S. supply of aluminum by 44,000,000 pounds during these two months. Most of the material went to *Kaiser Aluminum & Chemical Corporation, Reynolds Metals Company,* and the *Aluminum Company of America.*



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ONTARIO—*Siscoe Metals Ltd.* wholly-owned subsidiary of *Siscoe Gold Mines Ltd.*, announces that the company set a new all-time record for silver output in 1952. Output for the year amounted to 1,033,100 ounces, compared with 915,484 ounces in the preceding year. Cobalt production was slightly lower for 1952 at 21,260 pounds.

NEW BRUNSWICK—Base metal prospecting has been greatly stimulated by the major strike on the *Brunswick Mining & Smelting Company Ltd.'s* property near Bathurst. Ground has been staked covering most of the distance between the discovery and the *Udd* concession, north of the town of Bathurst—about 25 miles. New entries into the field include *The N.A. Timmins Corporation, Conwest Exploration Company Ltd., Maritimes Mining Corporation, Anacon Lead Mines Ltd.*, and *Harrison Drilling & Exploration Company.*

SASKATCHEWAN—*Dome Mines Limited* has entered the St. Mary's Channel uranium area at Lake Athabaska through a subsidiary exploration company and large-scale financing of a new company, *Crackingstone Mines*, has been initiated. Original stakers were Dr. G. C. McCartney and H. C. Norman.

YUKON TERRITORY—Record production at *United Keno Hill Mines Ltd.* is indicated this year, according to President F. M. Connell. Capital expenditures will be about $400,000 this year, compared with $1,900,000 last year. Daily tonnage is now up to 428 tons per day, and an average of 400 to 450 tons per day is expected for the balance of the year, making the mine one of the world's largest silver producers. Increased ore tonnage has been located in the *Hector* mine.

ONTARIO—*Canadian Rock Salt Company*, a wholly owned subsidiary of the *Canadian Salt Company*, plans to operate a newly acquired property near Windsor, Ontario for the production of rock salt. Work is already under way on a 16-foot, multi-compartment, concrete-lined shaft. Plans call for opening two levels where high-grade rock salt is available. All grades of industrial and highway maintenance rock salt will be produced. Rock salt mining in dry form is new to this part of Canada. The only other mine of this type currently in operation in Canada is the *Malagash Salt Company* in Nova Scotia, another subsidiary of the Canadian Salt Company.

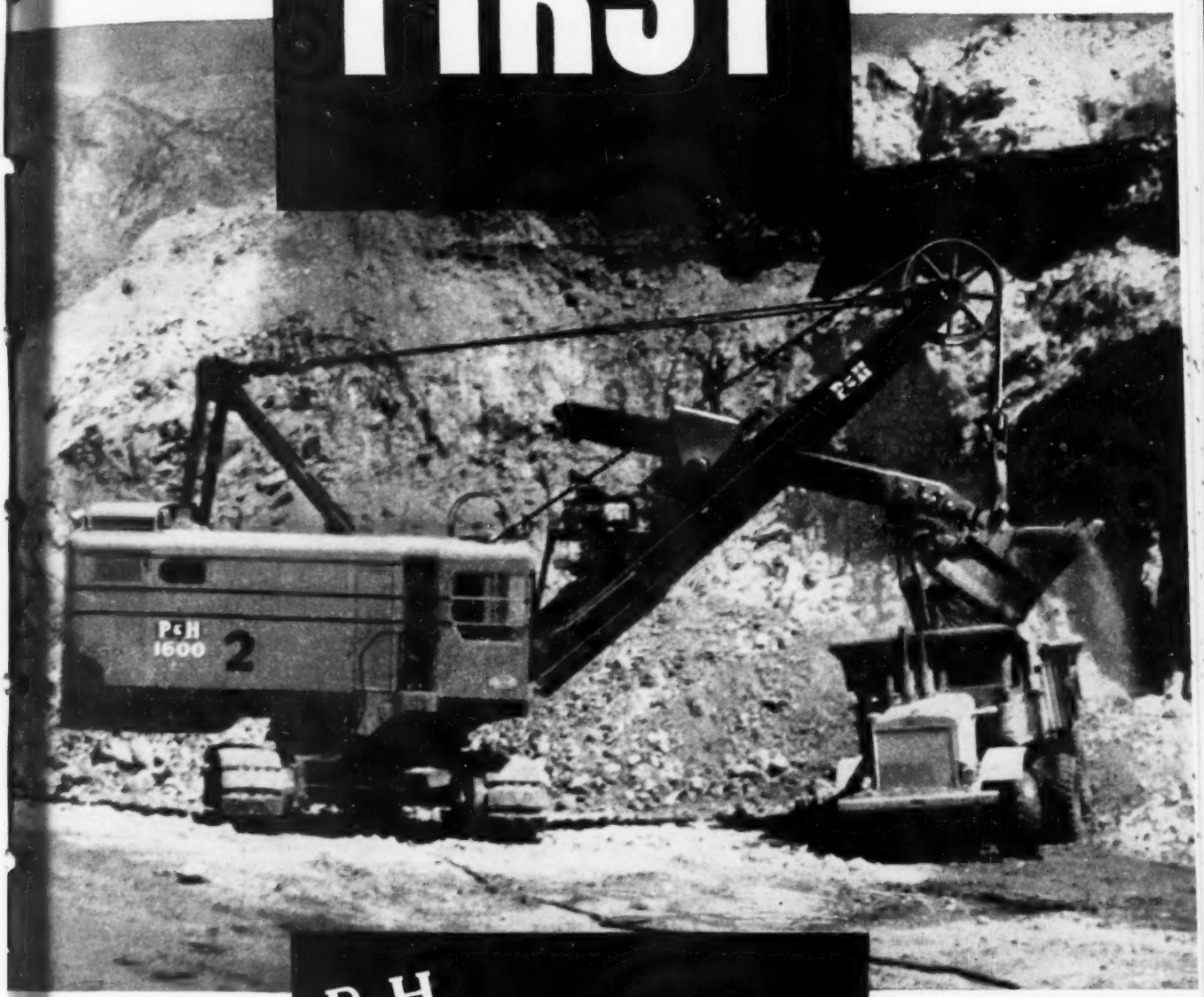
MICHIGAN—The *North Range Mining Company* of Negaunee has announced that it is planning to develop an iron mining area at Sapawe, Canada about 100 miles east of International Falls, Minnesota. Full production will depend upon results of a blast furnace test later this year.

YUKON TERRITORY—Resumption of drifting on the second level at *Yukeno Mines Ltd.* has permitted the company to add 48 feet of new ore length to the main vein. Ore averaged 15.98 percent lead, 19.10 percent zinc, and 46.01 ounces silver per ton.

ALASKA—A 187-pound shipment of jade has been made from the Kobuk River area north of the Arctic Circle to the *Alaska Native Industries Cooperative Association* in Seattle.

QUEBEC—During January, *Ascot Metals Corporation Ltd.* treated 18,412 dry tons of ore, from which 1,864 dry tons of lead-copper and zinc concentrate were shipped to smelters with a payable metal content of 434.07 ounces gold, 31,367 ounces silver, 231,889 pounds copper,

FIRST



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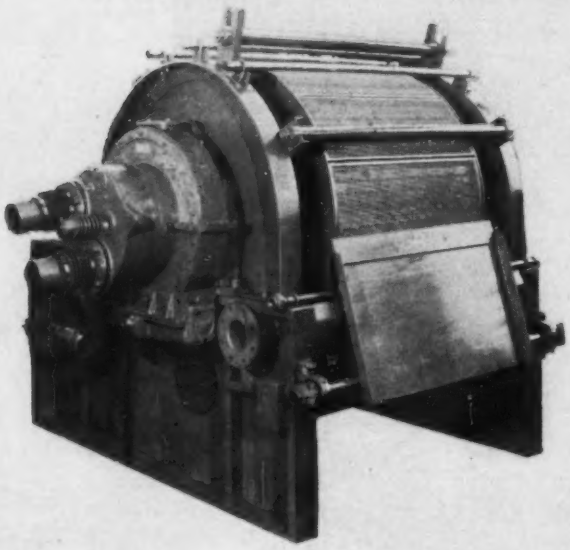

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314,686 pounds lead, and 1,140,342 pounds zinc. This is the best monthly production to date.

SASKATCHEWAN—*Vic[illegible]ac Mines Ltd.*, has acquired a 95 per cent interest in a 28-claim uranium property on Johnson Island in Lake Athabasca.

NEW YORK—The *American Institute of Management* has awarded certificates of management excellence to six mining companies. Those recognized by this honor include *Texas Gulf Sulphur Company, Inc.; Freeport Sulphur Company; Newmont Mining Corporation; Homestake Mining Company; Hudson Bay Mining & Smelting Company, Ltd.*; and *Noranda Mines, Ltd.* All receive the award for the third consecutive year.

SASKATCHEWAN—*Quesabe Mines Ltd.* will conduct a diamond drilling test this spring on its recently acquired nine claims in the Beaverlodge Lake district of northern Saskatchewan. Preliminary Geiger counter work is reported to have indicated several radioactive zones along a fault escarpment for distances of 600 and 500 feet, respectively.

BRITISH COLUMBIA—*Pioneer Gold Mines of B. C. Limited* reports that its gold production for the third quarter of the current fiscal year, the three months ended December 31st, 1952, was 10,957 ounces from 25,676 tons of ore treated. Preparatory work and installations for the new internal shaft (No. 5 shaft) were practically completed by the end of December.

SASKATCHEWAN—G. E. Buchanan, president of the *Jahala Lake Uranium Mines Ltd.*, has announced that diamond drilling operations are soon to commence on a new 16-claim property 40 miles northeast of Lac La Ronge. Samples taken from the area have shown high uranium assays. Drilling will begin as soon as prefabricated homes and buildings and equipment for workers are moved from Lac La Ronge to the drilling area.

ONTARIO—F. R. Burton, president of *Buffalo Ankerite Gold Mines Ltd.*, has informed shareholders of the company's plans to close down the mine. Development in recent months, it is stated, has failed to yield ore bodies of sufficient importance to warrant continuation of drilling. To conserve the company's assets, easily accessible ore will be salvaged and the mine then closed. The plant and equipment have been offered for sale, and the possibility of disposing of them at a reasonable price is considered favorable.

SASKATCHEWAN — Franc Joubin, managing director of *Rix Athabasca Uranium Mines Ltd.* reports that the mine shaft is now sunk to a depth of 300 feet and has a capacity of 1,000 tons daily. At the 150-foot level, high radioactivity readings were encountered in the crosscut which was 20 feet from the ore zone. Cross cutting is also under way at the 250-foot level. Mr. Joubin said a series of closely spaced underground drill holes on both levels cut the ore zone at 25-foot intervals revealing the ore zones were considerably wider than indicated by surface drilling. Following the start of drifting operations, the company is expected to be initially breaking about 50 to 60 tons of development ore daily. This ore will be stockpiled until milling operations commence at the new Eldorado plant in April. Rix Athabasca announces an increase in authorized capital from 3,000,000 to 4,000,000 shares of $1 par value. Arrangements have also been completed by company directors for sale

of 250,000 shares to a group of English mining interests which will also be given the first right to participate in any future financing of the Rix Athabasca development.

QUEBEC—*Merrill Island Mining Corporation* is surface drilling at the 150-foot level on its Dore Lake property in Quebec and indicates 3.83 percent copper over a core length of 18.7 feet.

YUKON TERRITORY—*Yukon Consolidated Gold Corporation* of Dawson has begun exploration work for copper at the 40-year-old *Gold Bottom Creek* mine.

BRITISH COLUMBIA—The *Paradise* mine in the Invermere area, and the *Silbak Premier* mine in the Stewart area, have been forced to close down because of the low price of lead and zinc. This brings to 16 the number of British Columbia mines which have been forced to cease operations since July 31, 1952.

MANITOBA—An electromagnetic survey is being made of the 147-claim property of *God's Lake Gold Mines* adjoining the *Sherritt Gordon Mines Ltd.* at Lynn Lake, for nickel-copper possibilities. Financing would come from an offer recently made to the company for 1,000,000 shares at $650,000. A magnetic survey was made over a portion of the property some years ago which revealed a large number of anomalies. Only a few of these were tested by diamond drilling at that time. One of the points of the electromagnetic survey will be to test these other anomalies and to try to eliminate any of those caused by magnetite.

SASKATCHEWAN—James MacKee, president of *Beaverlodge Uranium Mines*, reports that assays have confirmed the presence of high-grade uranium values at shallow depth on its northern Saskatchewan property. From the drift face of the first 25 feet on the 90-foot level uncut samples averaged 2.07 percent U_3O_8 over 2½ feet, while cut samples averaged 1.18 percent. The company's mine manager reports that the next 30 feet was low grade with high grade again being picked up with pitchblende visible in the face.

QUEBEC—Construction of the 360-mile railroad linking the Labrador-Quebec iron ore development of Iron Ore Company of Canada with Seven Islands, the small town from which ore will be transhipped, is to be completed this year. More than 115 miles of rail have been laid, and 200 miles of grading, including 30 miles at the northern end, are finished. Big Diesel-electric power work trains are moving supplies and equipment to the northern end of the track in preparation for an all-out push this year. Much work has also been accomplished in readying the mines for production. Earth and rock stripping of the orebodies near Knob Lake will begin in the summer and the ore will move southward as soon as the railroad is ready. Total expenditure to date on the project is reported at $112,000,000.

ONTARIO—A $50,000 financing plan has been concluded between *Durham Red Lake Gold Mines* and the company's president William C. Durham, under which a block of 700,000 shares was placed in trust for benefit of the company by Mr. Durham who then purchased 250,000 shares at 20 cents each to net the treasury $50,000. With these funds in the treasury, Durham Red Lake has acquired a controlling interest in *The D.C.H. Mining Syndicate* which has a working option on a silver-cobalt property in South Lorrain township, Cobalt District, Ontario. E. B. E. de Camps, consulting engineer, reports two drill holes on this property earlier indicated cobalt mineralization, with one hole intercepting five inches of massive cobalt. Durham Red Lake Gold Mines has also purchased 17 claims in Montgomery township, Algoma district, Ontario. A series of trenches has indicated a copper zone on the Montgomery property, and diamond drilling is now being considered on the recommendation of John C. Rogers, consultant.

BRITISH COLUMBIA—A vein, now called the "93," was intersected on the 26th level at the *Bralorne Mines Ltd.* property. It is a "cross-over" between the "51" and "77" veins. As developed to date, it assays better than mine average over stoping width. Development of the "77" vein below the 20th level is continuing and, as the vein is usually narrower than drift width, dilution from drifts is mainly responsible for the lower grade mill-feed in recent months. Operations at the *Gray Rock* prospect and at the *Yalakom* property were suspended in December because of winter conditions.

EUROPE

CYPRUS—The Esperanza Copper and Sulphur Company will erect a plant in Cyprus with an initial capacity of 165,000 tons annually of semi-oxidized ore. The plant is expected to have an operating profit of £450,000 a year. This estimate is based on recoveries of pyrite 80 percent, copper 75 percent, gold 70 percent, and silver 50 percent.

ITALY—During the first 10 months of 1952, production of crude sulphur reached 174,000 tons, against 163,000 tons in the previous year. During the same period, 51,000 tons were exported against 72,000 tons. For the period of 1952 and 1953, the *Ente Italiano Zolfi* has established the following minimum prices for Sicilian sulphur: superior yellow grade 44,000 lire per ton ($70.40); inferior yellow 43,000; good yellow 42,000; low-grade yellow 41,300. All mines must deliver their production to the Ente.

SWEDEN—During 1953, 6,000,000 tons of iron ore will be exported to Western Germany against 5,250,000 tons in 1952. The *Grangesberg Mining Company* will ship at least 3,000,000 tons to Baltimore, Philadelphia, and Mobile in the United States, with at least half of this quantity going to Baltimore.

AUSTRIA—Magnesite production in Austria last year was 86.6 percent above the 1937 production total. During 1937, Austria produced 397,383 metric tons; in 1951, 664,839 metric tons; and in 1952, 742,292 metric tons.

ENGLAND—The *South Crofty* mine of *South Crofty Ltd.* averaged 45 tons of tin concentrate during the last three months of last year which is quite an increase over the 33-ton rate at the beginning of 1952. The fall in production during 1951 was largely due to the failure of one of the Cornish pumps which, in turn, caused flooding of part of the mine.

NORWAY—World production of aluminum in 1952 was nearly equal to the peak production of 1943 which totaled 1,870,000 metric tons, according to the results of a survey undertaken by the *Norwegian Aluminum Company*. Plans approved in 1951 and 1952 for expanding output will, in the course of the next

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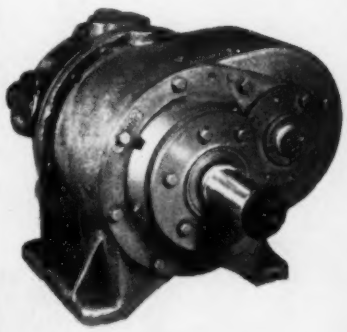

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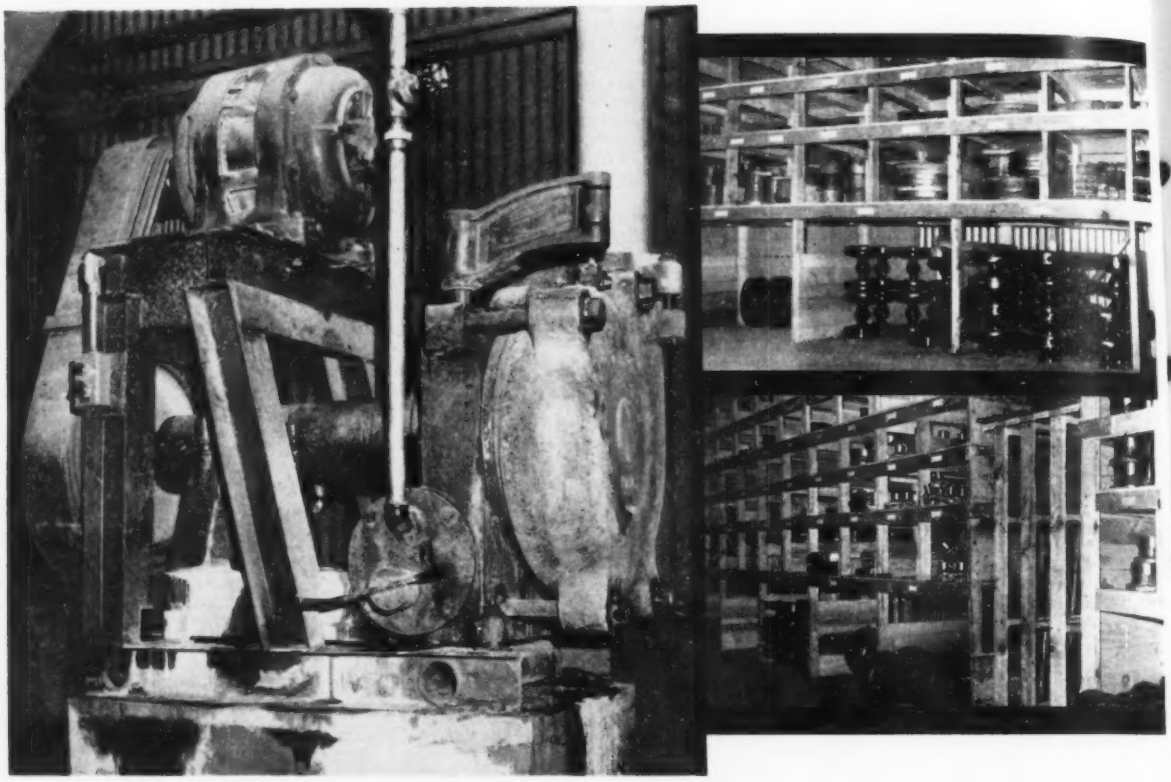

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three years, increase annual production by almost another 1,000,000 tons. Although the major expansion plans are in the United States and Canada, Europe also plans to increase output by 150,000 tons, and Norway will contribute 50,000 tons to this increase. The new aluminum plant at Sunndalsora in western Norway, designed to produce 40,000 tons a year, will be ready in 1954 or 1955. Norway's production of aluminum in 1952 was 51,700 tons.

AUSTRIA—The copper mining industry produced a total of 140,165 metric tons in 1952, as compared with 84,884 tons during 1951. The new mine near Buchberg in Salzburg province and the processing plant near Muehlbach, also in Salzburg province, are mentioned as the chief contributors to this increase.

CZECHOSLOVAKIA—1952 steel production amounted to 3,700,000 metric tons compared with 1937 production of 2,300,000 metric tons. The new high is said to be the absolute capacity of the country's production facilities.

YUGOSLAVIA—Work is expected to start soon on the country's first manganese separator which will be built at the *Zletovo* mine in Macedonia. The plant is scheduled for completion next year and will have a capacity of 24,000 tons a year.

RUMANIA—Rumania's totally nationalized and government-operated mining industry reported a surplus production in 1952 of 5.6 percent above the prescribed volume, while the metallurgical industry reported an overfulfillment of its plan by 2.7 percent.

U.S.S.R.—The 1952 steel production behind the Iron Curtain is reported to have risen from 17 percent in 1938 to 22 percent during the past year, including output from all European countries under Soviet control and the European part of the U.S.S.R. The actual production is estimated at 24,000,000 metric tons in the Soviet Union during 1952, as compared with 18,100,000 metric tons in 1938, and 11,200,000 metric tons from the present Soviet satellites, as compared with 6,200,000 tons in 1938.

YUGOSLAVIA—More than 10 percent of the country's entire investment for 1953 will be designated for the nonferrous industries, mainly to build processing plants which will shift the emphasis from exports of nonferrous ore to nonferrous semi-finished and finished goods. About 1,200,000,000 dinars are allocated for the program which will include building of an aluminum plant and an aluminum rolling plant; increasing of bauxite production to 50,000 metric tons; and increasing of aluminum production to 13,000 metric tons annually. A new copper electrolytic plant near Bor will have a capacity of 16,000 metric tons annually.

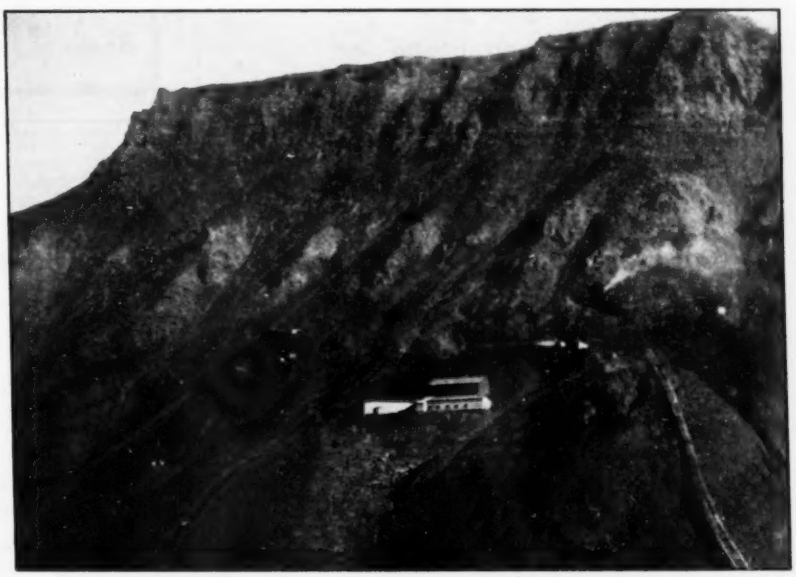
GREECE—*New Calumet Mines Limited* operating on Calumet Island, Greece, milled 267,510 tons of ore in the year ended September 30, 1952. Metal produced in concentrate form totaled 19,756,587 pounds of zinc, 5,732,390 pounds of lead, 485,532 ounces of silver, and 4,350 ounces of gold. Net profit for the year amounted to $274,293.37 as compared with $1,088,969.59 in the previous year. The decline in metal prices was considered the chief factor in the serious decline in earnings. The new production shaft, which was started in September 1951, had reached a depth of 1,324 feet by September 1952. Since then, sinking has been suspended, at a depth of 1,400 feet, until the company's financial condition improves. At the end of September, ore reserves were estimated at 846,821 tons averaging 6.5 percent zinc, 1.5 percent lead, 3.19 ounces per ton of silver, and 0.016 ounces per ton of gold. This includes 411,500 tons between the 1,500- and 2,100-foot horizons.

CZECHOSLOVAKIA—Workers of the *Vitkovice Iron Works* have declared that teh government's production plan cannot be filled. Insufficient equipment, varying rhythms of work in the processing stages —according to the efficiency of the outdated machinery—and the many non-factory activities required of the workers were cited as the obstacles.

AUSTRIA—The new zinc plant, *Geilitz*, near Bleiburg, Carinthia, will process zinc ore formerly sent to Belgium, Western Germany, or the Netherlands. However, the plant will not be ready until 1954. Initially, its output will be 4,000 to 5,000 metric tons of zinc annually. Later, output will be increased to 10,000 tons. Present Austrian consumption requirements are about 8,000 tons and no increase is expected so at least 2,000 metric tons of pure zinc will be exported beginning in 1956.

ENGLAND—The *Greenside* mine at Glenridding near Penrith, Cumberland, continues to produce lead, while the *Haggs* mine nearby is being reopened as a zinc mine by the *Anglo-Austral Mining Company*. The ore will be taken to a flotation plant at Nenthead for treatment. The same company is also developing the *Cambrookeels* mine in Westgate near Weardale for fluorspar. The mineral will also be taken to the plant at Nenthead for production of acid-grade fluorspar. The *Blackdene* mine, also in Weardale, is being reopened by the *United Steel Company*. A winze sunk below existing workings has exposed good fluorspar, and a jig plant is being erected. The ore is rich in fluorite, with a little galena and silica. *Fluorspar Ltd.* is still operating its *Stanhopeburn* mine using both jigs and tables as roughers and a flotation plant for production of acid-grade fluorspar.

SWEDEN—The *Sveriges Geologiska Undersokning (the Swedish Geological Research Society)* is planning to intensify its diamond drilling in the districts of Skellefteå, Kiruna, Pajala, and Stekenjokk in northern Sweden, and in the northern part of the Jamtland province. The society has applied for 819,000 kronors allowance in 1953 from State funds.



MINING COAL IN SPITZBERGEN

The Norwegian mines in Spitzbergen shipped 454,000 tons of coal in 1952. The amount from Longyear City, 384,000, was the largest on record for that community. Spitzbergen, or Svalbard as the Norwegians call this group of islands in the Arctic Ocean, consists of Spitzbergen, Kvitoya, Kong Karls Land, Hopen, and Bjornoya. The coal deposits are quite large, but Norway is not the only country mining them. Annual coal production in Spitzbergen in the period from 1926 to 1930 was not quite 267,000 tons, nearly all of which was produced by Norwegian mines. In 1936, this total increased to 784,000 tons, with the major part of the increase coming from Russian mines which had then reached an output of 400,000 tons. Of the total exports from 1907 to 1947, the Norwegian companies exported 5,848,000 metric tons and foreign companies 3,275,437 tons. The mines were damaged during World War II when the English evacuated the population and destroyed mine machinery so that the Germans could not use the coal for their warships operating from bases in northern Norway. A German attack in 1942 almost completely destroyed Longyear City, but it has now been rebuilt. The picture above was taken in Longyear Valley with Mine No. 2 in the background. This mine was set on fire by German warships in 1943, and the fire is still raging although it is now under control. Though Spitzbergen is icebound in winter, mining continues in preparation for the summer shipping season.

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ITALY—Exploration of metalliferrous mining prospects in Sardinia is being undertaken by a new company (*RI. MI. SA.*), recently formed as a joint venture of four mining companies in the region. Sardinia, the most important lead-zinc mining district of Italy, has a considerable number of out croppings of lead, zinc, and lead-zinc sulphide occurring outside of the regular mining areas which might be worthy of closer examination.

AUSTRIA—The *Linz Iron and Steel Works* plans to develop a large ore deposit in the Plankogel district of East Syria. The deposit was investigated by the Office of the German Reich for Geological Research during World War II. The deposit is reportedly large enough to make Austria largely independent of foreign ore imports.

LATIN AMERICA

MEXICO—Claim to a reportedly rich mercury deposit he discovered has been filed by Justino Riva Palacio with the Ministry of National Economy. The deposit was found in mines at Colonia de San Angel, Cuencame municipality, Durango, which have long been abandoned. Mr. Palacio plans to establish a retorting plant.

SURINAM—Bauxite exports reached an alltime high of 3,155,000 metric tons valued at $19,500,000 in 1952, compared with 2,674,500 metric tons valued at $17,000,000 in 1951. *Surinam Bauxite Company, Ltd.* accounted for 1,687,500 tons from Moengo and 880,000 tons from Paranam. The *Billiton Company, Ltd.* exported 587,500 tons from Onverdacht. Exports for 1953 are expected to be somewhat less, but the value will be about the same because of production of more calcined-grade ore. Gold shipments during the year totaled 6,315 ounces against 6,500 ounces in 1951.

PERU—Shipments of heavy machinery destined for the *Marcona Mining Company* in Peru are being made by the *Utah Construction Company* of San Francisco. Included in the first consignment to San Juan Bay were two large Manitowoc shovels, prefabricated conveyor gallery sections, conveyor belting, vibrating screen, steel girders, trucks, bulldozers, cement, and lumber. Utah holds an interest in the Marcona company which is developing a large iron ore deposit. When actual mining begins, iron ore will be sent to Philadelphia, Baltimore, and Mobile.

ARGENTINA—The government of Buenos Aires province has undertaken a $1,000,000 geological and mining survey of the Sierras of Tandil, Pillahuinco, de las Tunas, Ventana, and Bravard in an attempt to locate the source of the titaniferrous sands of the Atlantic coast between Miramar and Mounte Hermoso. Included in the same program are preliminary studies of the dolomite and limestone deposits in Puan, Saavedra, Coronel Suarez; exploration of the zones of Junin and Delta for foundry earth; the gathering of mining statistics of the province; and an economic and geological survey of the entire province.

CUBA—Under a contract with the United States Defense Minerals Procurement Agency, the U.S. Bureau of Mines is drilling on the Zoilita Denouncement in Cuba. By the end of October, 124 holes had been drilled to explore an area of about 500 acres. Preliminary tonnage of the deposit is estimated at 1,500,000 tons containing a little more than 1.0 percent nickel and cobalt combined. Both would be sent to the *Nicaro* plant for processing if mining is undertaken.

MEXICO—Silver production in 1952 amounted to 45,500,000 fine ounces, an increase of 1,200,000 ounces over 1951 production. The Bank of Mexico bought 41,000,000 ounces some 30,000,000 ounces of which was newly mined. The Bank sold 23,000,000 fine ounces to Saudi Arabia, 6,000,000 to Western Germany, and 2,500,000 ounces to other countries not identified. Minting for Mexico took 8,300,000 ounces last year. The Bank indicated that it ended the year with a silver reserve of about 30,000,000 ounces.

VENEZUELA—During 1952, the United States imported from Venezuela $754,256 worth of uncut diamonds for industrial purposes.

COLUMBIA—Annual production figures for last year show that *Asnazu Gold Dredging, Limited* dredged 6,761,200 yards to recover 18,782 fine ounces of gold, as compared with 5,887,500 yards in 1951 to recover 18,725 fine ounces. *Nechi Consolidated Dredging Limited* dredged 4,539,000 yards in 1952 to recover 11,548 fine ounces of gold, compared with 4,631,000 yards in 1951 to recover 21,119 fine ounces. *Pato Consolidated Gold Dredging, Limited* reports 19,779,300 yards dredged in 1952 for a recovery of 161,422 fine ounces of gold, compared with 18,976,500 yards in 1951 for recovery of 175,164 fine ounces.

MEXICO—Annual sulphur production in Vera Cruz will be at least 4,000,000 tons says the Ministry of National Economy in announcing that the new plant of *Gulf Sulphur Company de Mexico, S.A.* will start operations in August 1954. The plant, located at Jaltipan, will produce this amount annually. It will be the first one outside of the United States to produce sulphur by the Frasch process. Geologists working at Jaltipan have explored only 40 percent of the domes so far. Gulf Sulphur, a subsidiary of *Pan American Sulphur Company*, holds concession to work about 19,800 acres in the Jaltipan sulphur belt.

SURINAM—The French *Grands Traveaux de Marseilles* which sent a mission of engineers and geologists to Surinam last December to survey the possibilities of the Brokopondo hydroelectric project has completed its first report. The mission reports favorably on the technical feasibility of the project.

BOLIVIA—The government's contract with the *Selim Chacur* group to provide an explosives factory, match factory, bank, and tin smelter has reportedly been cancelled.

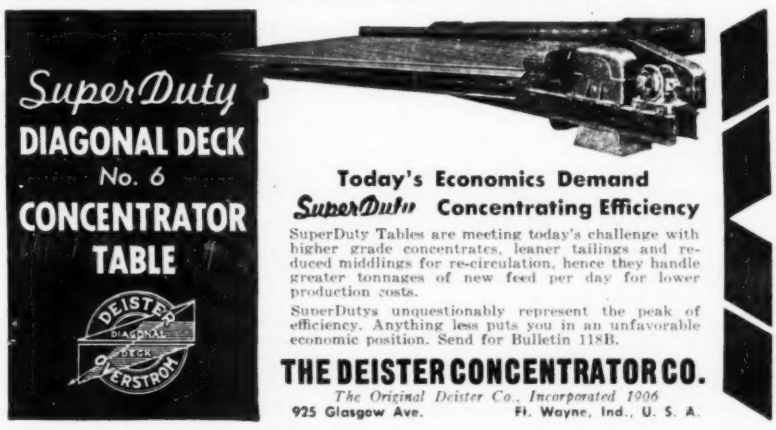
MEXICO—The National Institute for the Investigation of Mineral Resources has asked for an increase in its 1953 budget in order to intensify its prospecting for uranium and thorium deposits. The Institute has requested 5,000,000 pesos ($570,000) for 1953; its 1952 allotment was 2,000,000 pesos ($231,000).

BRAZIL—About $1,500,000 will be spent by the Brazilian government in the production of minerals in 1953. Part of the money will be used in prospecting for uranium deposits, and special attention will also be given to the monazite sand deposits of Rio de Janeiro, Espirito Santo, and Bahia states. The cooperation between Brazil and the United States Geological Survey regarding the determination of the values and extension of the iron ore deposits of Minas Gerais will continue in 1953. The program also includes such studies as the zirconium minerals, the bauxite and the leucitic rocks of the Pocos de Caldas region, Minas Gerais; the tin deposits of Sao Joao del Rey, Minas Gerais; the phosphate deposits of Pernambuco and Paraiba States; the wolframite, tantalum, columbium and berylium mineral deposits of the northern part of the country.

MEXICO—A search for gold along the United States border zones of Sonora has been started by the National Institute of Geology.

BRITISH GUIANA—*Kennametal, Inc.*, through its South American subsidiary *Kennametal International*, is exploring in British Guiana for columbite which the firm uses in processing its heat-resistant kentanium.

CUBA—A deposit of uranium has reportedly been discovered on property owned by a farmer near Camaguey.



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Van Stone

(*Continued from page* 31)

sary for uniform operating conditions in order to achieve optimum recovery of the less than 0.5 percent lead content of the ore. This is accomplished by the ease in regulating the machine, air control being an important factor.

Denver "Sub-A" machines are used as lead and zinc cleaners and re-cleaners to obtain high-grade concentrates. Ease of pulp level control and "quiet" operation are important for high-grade concentrate production.

Fagergren machines are used as zinc roughers to obtain the lowest possible zinc tailing.

Flotation Section

The six banks of flotation cells are all on the floor below the grinding section. They are arranged in parallel rows running with the long dimension of the mill. Fluorescent lighting, together with the absence of windows in this section of the mill, assures uniformity of light to facilitate flotation control.

A battery of Clarkson reagent feeders at the head of the flotation floor insure ease of access of rapidity of adjustment for any reagent.

Agitair Lead Roughers

Lead flotation feed (classifier overflow) enters the first cell of a bank of 10 No. 48 Agitair flotation cells. A rougher concentrate is made in the first four cells. The concentrate from the last six cells is recirculated to the first cell of the bank.

Denver Lead Cleaners

The concentrate from the first four cells flows to a 1-inch Wemco froth pump (stand-by pump available) which elevates it to a four-cell, No. 18 Denver "Sub-A" cleaner. It is cleaned twice and the concentrate is then recleaned once in a two-cell, No. 15 Denver flotation machine.

Final concentrate is sampled by a Geary-Jennings automatic sampler and flows to an 18- by 8-foot Dorr thickener. Overflow from the thickener is pumped to the head of the lead circuit and underflow is elevated first by a diaphragm pump and then a bucket elevator to a two-disc, 6-foot Eimco filter set on top of the concrete storage bin. Concentrate drops directly to storage.

Fagergren Zinc Roughers

Zinc flotation feed (lead rougher tailing) flows to the first of two 8- by 8-foot Wemco conditioners operated in series. Conditioned pulp is pumped to flotation by a 4-inch Hydroseal pump (stand-by available). A rougher concentrate is pulled from a bank of six 66-inch Fagergren cells. Tailing from these cells is then floated in seven 66-inch Fagergren cells. The first of these is a "pumper cell." Concentrate from the second bank is reground in a section composed of a Marcy No. 47 ball mill and two 3-inch Dorrclones, and then returned to the zinc circuit.

Tailing from the 12th Fagergren cell is sampled. A portion is cut out and tabled over a Wilfley pilot table for the operator's visual inspection as a rapid check of flotation operations, and flows to the 90-foot Dorr thickener on the hillside below the mill.

Tailing thickener overflow is pumped to the 200,000-gallon mill water tank and the thickener underflow (final mill tailing) is impounded in a series of dams.

Zinc rougher concentrate is pumped to a bank of six No. 24 Denver "Sub-A" machines for recleaning. After being cleaned twice zinc concentrate is sampled, a portion being pilot tabled, and thickened in a 30- by 10-foot Dorr thickener. Overflow is pumped to the conditioner at the head of the zinc circuit, and underflow elevated to the five-disc 6-foot Eimco filter.

Concentrate Handling

The lead and zinc concentrate storage bins are located at the mill's lowermost end and against the building's wall. Large doors open directly into the bins to permit a Hough Payloader to run right into the bin, pick up a load, and dump directly into a truck, since the truck road is five feet below the level of the bottom of the bin. Concentrates are trucked 10½ miles to a Great Northern Railway siding near Marble, Washington. The trucks are equipped with a special Anthony sloping sided cinder body with a pan discharge conveyor extending the full length of the body. This conveyor is 16 inches wide and extends 5 feet behind the back end of the truck. To unload the truck, the driver backs up the ramp, the top of which is level with the top of a railroad gondola spotted on a spur track. The truck is stopped with the end of the conveyor extending over the car. A power take-off unit drives the conveyor to unload the 10 tons of concentrate in about nine minutes. Zinc concentrates are shipped to Anaconda Copper Mining Company's Great Falls, Montana zinc plant, and lead to ASARCO's East Helena, Montana lead smelter. The zinc is destined for the strategic stockpile under the terms of the contract calling for delivery of 18,436 short tons of zinc in a 3½-year period at a commitment purchase price of 15.5 cents per pound under the terms of a contract with the Defense Materials Procurement Agency effective on March 5, 1952.

Reagent Mixing

All reagents are delivered by truck to a special section of the

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mill below the flotation floor. Reagents are batch-mixed and solutions are pumped to a series of 300-gallon storage tanks on a platform built high above the flotation floor. From the tanks, plastic hoses convey solutions to Clarkson reagent feeders on the flotation floor.

Auxiliary Buildings

A modern assay office adjoins the mill building. It is equipped for both wet and fire determinations. A complete set of laboratory-size metallurgical equipment is available for conducting research investigations leading to betterment of the mill's operation.

The spacious office building houses the supervisory personnel offices, the accounting office, the geology and engineering department with its large fire-proof vault for maps and records, and a first aid room.

A separate employees' change room adjoins the mill building. The machine-welding shop is equipped to make emergency repairs and carry out normal maintenance. Isbell operates its own truck and heavy equipment garage and shop. A warehouse, crane-equipped, completes the mill's buildings.

Four modern company-built houses are occupied by key personnel.

Water Supply

Mill and camp water is collected from three forks of Onion Creek. Tailing is thickened and water reclaimed and repumped for mill make-up water.

Fresh water is collected in a 20,000-gallon tank and pumped to a 60,000-gallon fire protection tank 200 feet above the top of the mill. Water from this tank flows through three separate pipe lines and is used for three purposes: as high pressure mill and camp fire protection water; for domestic water; as make up for the 200,000-gallon mill storage tank set 100 feet above the mill.

Standardize Where Possible

It is interesting to note that the Van Stone mill incorporates certain features similar to those which ASARCO has proven to be best in design and operation at its mill in Deming, New Mexico, described in the September 1950 issue of *Mining World*. These are: constant head water tank for grinding-classification, transfer tower, fluorescent lighting of flotation section, centralized reagent handling, and loading of concentrates from mill bins.

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The mine and mill have been engineered, designed, and built to operate at the highest peak of efficiency at the lowest cost: these are a credit to the entire staff. It took geological skill to correctly predict the turn in the orebody which substantially increased tonnage. It took real courage to develop the open-pit mine where below-zero temperatures are common and winter snow-fall reaches 110 inches. It took real vision to design a mill which would recover every pound of zinc and lead in the low-grade ore.

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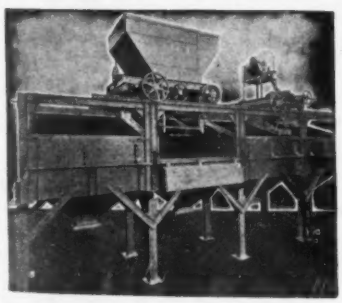

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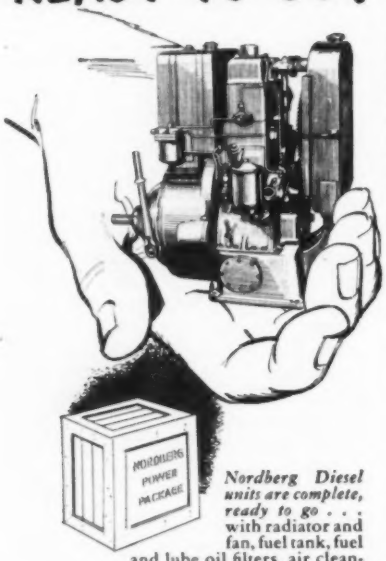

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ZINC:	Prime Western. East St. Louis	11.00¢
	Tri-State Concentrate, 60% zinc, per ton	$70.00
ALUMINUM:	Primary 30 pound Ingots (99% plus). F.o.b. shipping points	20.50¢
ANTIMONY:	Lone Star Brand. F.o.b. Laredo, in bulk	35.00¢
BISMUTH:	(In ton lots) price per pound	$2.25
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COBALT:	97-99%, keg of 550 pounds (Price per pound)	$2.40
MAGNESIUM:	Ingots (99.8%). F.o.b. Freeport, Texas	27.00¢
MERCURY:	Flasks. Small lots, New York	$201.00-$204.00
NICKEL:	"F" Ingots (5 pounds). F.o.b. refinery, Port Colburne, Ontario	60.00¢
TIN:	Grade A Brands New York (Price per pound)	121.50¢
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	Foreign Handy & Harman	85.25¢ per ounce
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African (Rhodesian). 48% Cr_2O_3 . . . . . $44.00-$46.00
African (Transvaal). 48% Cr_2O_3. . . . . $34.00-$35.00
Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio . . . . . $54.00-$56.00
U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.

COLUMBIUM-TANTALUM ORE: At small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore.

IRON ORE: Lake Superior. Per gross ton Lower Lake Ports.
Mesabi, Non Bessemer, 51.5% Fe . . . . . $ 9.05
Mesabi, Bessemer, 51.5% Fe . . . . . $ 9.20
Old Range, Non Bessemer . . . . . $ 9.30
Old Range, Bessemer . . . . . $ 9.45

MANGANESE ORE: Metallurgical grade. 46 to 48% Mn. Long ton unit . . . $1.20-$1.22
Chemical grade. 80% MnO_2. Per ton $70.00
U. S. Government ore purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treatment costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base prices of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana; base price of $6.43 per long dry ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

MOLYBDENUM CONCENTRATE: 90% MoS_2. F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers $1.00

TUNGSTEN CONCENTRATE: 60% WO_3. Per short ton unit $65.00

URANIUM ORE: Carnotite-Roscoelite. F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita, and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.

VANADIUM ORE: Carnotite-Roscoelite. V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock. . . . Per Pound V_2O_5, $0.31

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh. F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b. Illinois-Kentucky mines	$42.50
	Acid grade. 97% CaF_2	$60.00
PERLITE:	Crude: F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Gulf Coast mines	$22.00

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

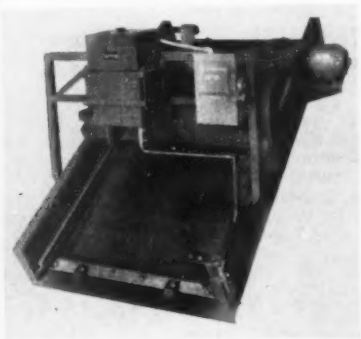
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

Improved Electric Heating For New NO-Blind Screen

A new model Leahy NO-Blind Heavy Duty Vibrating Screen, equipped with an improved design of FlexElex equipment for electrical heating of the screen jacket, has been announced by the Deister Concentrator Co. of Ft. Wayne, Indiana.

Opening up an entirely new range of screening applications in fields where good or practical performance formerly



could not be expected from conventional type vibrating screens, the FlexElex heating arrangement has been engineered especially for fine mesh screening of damp materials such as ores, clays, fine limestone, shales, coal and chemicals. A low voltage, high amperage electric current is passed through the screen cloth, causing it to heat sufficiently that the wires are kept warm and dry. When the advantages of FlexElex heating are added to the Leahy's unblinding action for disposing of intermediate size particles, the result is an efficiency and capacity never achieved before in the screening field.

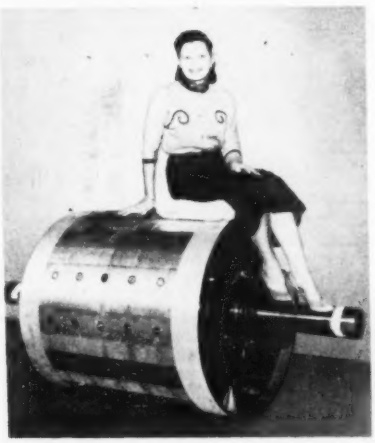
The new Flex-Elex features are factory incorporated to permit easy and simple field installation, and may also be readily installed for conversion of older Leahy units already in the field. For further information write the manufacturer, or circle 71.

I-P Tool Changes Name To Thor Power Tool Co.

Stockholders of the Independent Pneumatic Tool company today voted to change its sixty-year old corporate name, effective March 17, to Thor Power Tool Company.

"Our business has so changed in the past years that the name of our company is no longer descriptive of our operations," Neil C. Hurley, Jr., president, stated.

The trade name "Thor" has been used as identification of all of the firm's power tools since 1893 and, according to Hurley, the new name utilizing the trade mark will eliminate confusion and facilitate easier recognition of the company's products.

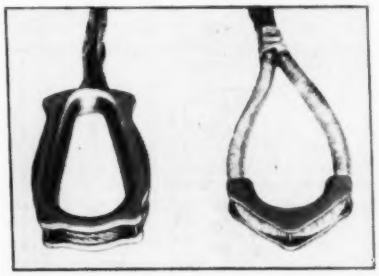


Biggest Magnetic Pulley

The cute gal, above, is perched on top of what is believed to be the biggest—36" diameter, 36" belt width—non-electric Alnico magnetic pulley ever built. Made by the Dings Magnetic Separator Co., Milwaukee, Wisconsin, this 2825 lb. Dings Perma-Pulley is used by a Missouri lead company to remove tramp iron from minus 3" lead-zinc on belt moving at 300 feet per minute with a capacity of 840 tons an hour. For telephone number . . . (pardon), for information on Dings line of Perma-Pulleys, circle 76.

New Braided Slings With Pin-Lock Fittings

A new 8-part braided sling, introduced by A. Leschen & Sons Rope Company, features an entirely new type of reuseable thimble fitting that is reported to save sling users up to 20% or more. These Pin-Lock thimbles are attached by pins instead of conventional hammered-down clamps—and are readily removable for reuse. Since sling fittings generally out-



last the sling itself, substantial savings are gained by the reuse of them. For example, on a sling made of ⅝-inch wire rope, of 10 ft. length, it is claimed that reuse of two full thimbles produces a savings of 23.6%. On a 10-foot, $^{3}/_{32}$-inch rope sling, reuse of thimbles saves 8.5%.

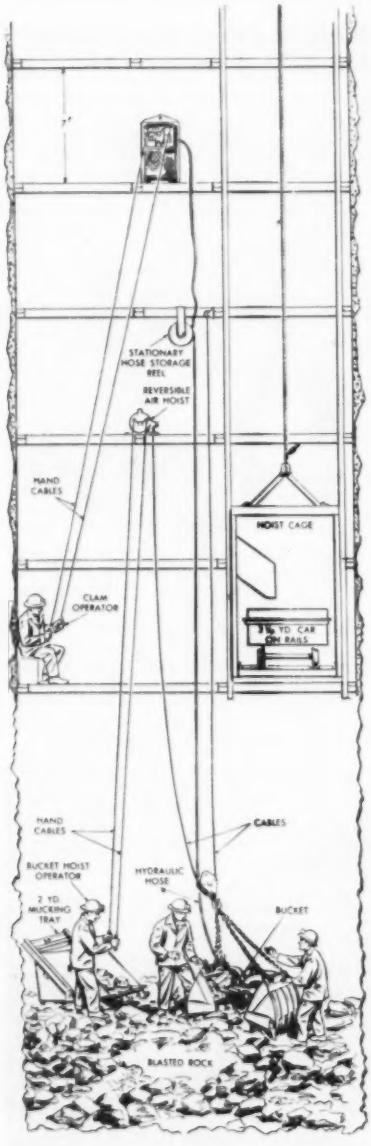
Complete information about the complete Leschen sling line is available from A. Leschen & Sons Rope Company, St. Louis 12, Missouri, or by circling 67.

EJECTOR EXTENSIONS ON "CAT" SCRAPERS

Caterpillar Tractor Co. has announced that ejector extensions are now available for five models of Caterpillar Scrapers. The extensions are designed to increase loading efficiency and decrease loading time. The extensions, available as attachments for the No. 80, No. 20, No. 21, No. 70, and No. 15 Scrapers, are made of steel bars welded together and attached to the top of the ejector. Scrapers equipped with ejector extensions will be particularly valuable when working in moist, sticky soils that have a tendency to peel up into slabs and break over the back of the ejector. The extension reduces spillage, and thus lessens the chance of cable fouling. By the same token, loading time is reduced. Attaching ejector extensions to the scraper will not hinder shovel or dragline loading. For further information circle 68.

Bucyrus-Erie Announces Half Yard Shaft Mucker

A larger, ¾-cubic yard capacity model of the hydraulically operated Hydromucker, has been announced by the Bucyrus-Erie Company. The new shaft mucker features all of the job proved ad-



vantages of its ¾ yard predecessor in addition to the larger capacity clamshell bucket. Both models are chain slung, low headroom buckets which operate effectively in as little as seven feet of headroom.

The heavy-duty, 2,025 pound ½-yard bucket has alloy steel lips and teeth and is closed by two single acting hydraulic rams mounted horizontally within the bucket yoke. Hydraulic power from two 6-cylinder axial style piston pumps each delivering pressures up to 3,500 psi provides maximum closing pressure at the teeth causing the bucket to bite down

into the muck rather than draw away during closing like rope reeved buckets which must be hoisted to close.

The sturdy, compact power unit, for use with either the ¾ or ½-yard bucket, is skid mounted and equipped with a lifting eye for easy handling. The 15-hp splash proof motor is equipped with a rain tight starting switch. Power to pumps is transferred through adjustable V-belts.

For full information on both models, see your nearby Bucyrus-Erie Hydrocrane distributor or circle 65.

Operation of Heiliners Subject of New Film

A new 16mm sound film in color showing the Heiliner-Scraper and Bottom Dump Wagon in action has been released by The Heil Co., Milwaukee 1, Wis. Both the 18 cu. yd. model 2C800 and the 15 cu. yd. model 2C500 Heiliners are featured.

Job shots of Heiliner-Scrapers and Bottom Dump Wagons in actual operation show the hi-speed earthmoving units working in different types of material. Scenes made on the Heil test grounds demonstrate the ruggedness and easy handling of the Heiliner. Complete operating details fully illustrate the fast loading and positive ejection features found in Heiliner scrapers.

This 400 ft., 12 minute movie is available to contractors, mine operators, and interested industrial firms from district Heil sales offices and their Heiliner distributor. Educational institutions may request the film through The Heil Co., Road Machinery Division, Milwaukee 1, Wisconsin, or by circling 74.

A-C Now Offers Full Line Of Pull-Type Scrapers

Allis-Chalmers industrial tractor dealers now offer 4-wheel scrapers to fit every job and every crawler tractor, according to the Allis-Chalmers Manufacturing Company's Tractor Division, Milwaukee, Wisconsin. The line includes seven models with struck capacities ranging from 2 to 18 cubic yards.

According to the company, this line was made available through the integration of four of their own models, formerly manufactured by LaPlant-Choate, with three made by Gar Wood. Because of this, there are no untried scrapers in the line. Each is thoroughly tested and proved. For complete catalogs circle 75.

ASCO's New Diamond Bit Catalog May Get "Oscar"

Anyway, MINING WORLD nominates it for the catalog-makers' Oscar. It's good looking and very usable too. It's 16 pages long, in three colors (black, green, brown). It has a special projecting tab for filing and is 8½x11" in size so that it can be filed with regular file folders. The sides are index tabbed (dictionary style).

The new catalog describes Anton Smit's complete line of diamond-drilling products. Many of these are standard—the Ascolite, Bronzolite and Nicolite lines—in sizes from LM (0.825" ID) to XXM (2.155" ID).

But there is one brand new ASCO bit. It's the Impregnabit, in which diamonds are impregnated all the way through the bit matrix. And for it, Anton Smit claims greatly increased usability of diamonds, with a resultant lowering of diamond costs. For your copy of "ASCO Diamond Drill Bits," circle 69.

Three New Distributors Named By Koehring Co.

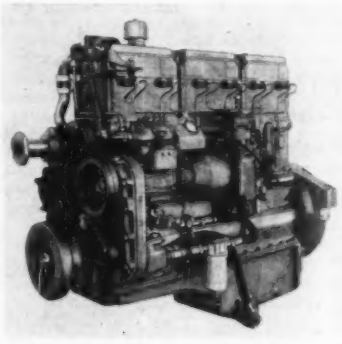
The appointment of new distributors for territories in Wisconsin, California and Florida has been announced by the Koehring Company of Milwaukee, manufacturers of heavy duty construction equipment.

In Wisconsin, Kelbe Bros. Equipment Co. of 5686 North Teutonia Avenue, Milwaukee, will handle Koehring products for the entire territory. In Florida Koehring has named Allied Equipment, Inc. 825 N.W. 72 Street, Miami, to handle Koehring products only in the 13 southern counties of the state.

The Northern California territory, which has been covered by Koehring Company West Coast Sales Division out of Stockton, has been delegated to the Standard Machinery Company of 450 Bayshore Boulevard, San Francisco.

Increased HP-Weight Ratio Featured By Cummins

In line with the continuous Cummins program to produce Diesel Engines with a maximum power-to-weight ratio, Cummins Engine Company, Inc., at Columbus, Indiana, announces the increase in horsepower rating of the HRBB-600 and HRBBI-600 engines. Power has been increased from 175 to 180 horsepower at



2000 rpm, with no increase in engine weight. The automotive version of this engine model—HRBB-600—is shown in the photograph. For complete information circle 66.

GOT A BEAUTY THAT NEEDS A BEAST? Well, then, and if you can't qualify, we got an idea we'll throw in the hopper this month. Apropos of nothing. But the Abbeon Supply Company has a beautifully modeled replica of Mr. Tyrannosaurus Rex—in solid metal with a royal bronze finish, yet. It's mounted on the base of a desk set. OK, so Tyrannosaurus Rex was no Marilyn Monroe. Fact is, he was a 50-foot meat-eating dinosaur by trade. But he was good to the kids and we like this harmless little model of him. If you'd like to find out how to get one, circle no. 27.

TRUCK "PREVENTIVE MAINTENANCE KIT": A complete maintenance control kit with Inspection and Control forms is available free of charge to owners of Euclid trucks. Paper work involved in the matter of maintenance control has been reduced by this scientific system to a matter of a few minutes daily. For further information circle no. 28.

TESTING LABORATORY SERVICE: Of interest to executives and metallurgical people is a new 12-page bulletin issued by Denver Equipment Co. covering the company's ore testing and laboratory services, with flow-sheets for many ores, machines recommended for each stage of the process and other data. To obtain Bulletin No. G3-B39 circle no. 29.

TORQUE CONVERTER INTEGRATED WITH GM DIESEL: The inside story of the General Motors Torque Converter, now an integral part of a number of GM Diesel engine models has been published by Detroit Diesel. Operating principles of the unit providing smoother power flow and engine protection are subject of the new bulletin, which may be obtained by circling no. 30.

PRECISION MAGNETOMETER REDUCES SURVEY TIME: The new Arvela Magnetometer, distributed in the Western Hemisphere exclusively by the E. J. Longyear Co. of Minneapolis, has a reading range of 4000 to 20,000 gamma with respective scale values from 10 to 50 gamma. The scale value can be readily adjusted in the field. The unit is described in a new Longyear bulletin No. 86 which also covers the company's new Straitline Core Drills. To obtain circle no. 31.

ENGINEERING AND RESEARCH AVAILABLE: With over 50 years of producing specialized equipment, the Pressed Steel Car Company's Engineering and Research Department will make certain your requirements are met on the most exacting custom jobs in car construction, as well as pipe and conduit rack, hanger, or shelving installations. Circle no. 7.

ECONOMICAL CAR HANDLING: Wherever cars must be handled in hauls up to 2000 feet or in isolated places, Eimco's two-speed air locomotive is the answer to efficient operation. With an exclusive transmission that gives the maximum distance per cubic foot of air consumed, Eimco's locomotive is finding wide use in switching and hauling. Bulletins are available; circle no. 8.

NEW METAL MINING MUCKER: The Whaley automatic loader, long famous for its rugged ability in fast rock-loading in coal mines, has now been mounted on crawlers for use in metal mines where fast, low-clearance loading means greater production at reduced cost. Circle no. 9.

FREE THE BIN: Hung chutes and stuck bins are the continuing plague of the mine or mill operator. The Cleveland Vibrator Company has a size and type of vibrator to fit any mining problem. So write for their free literature on the subject by circling no. 10.

COLD WEATHER SCREENING: Bee-Zee round rod screens drain more quickly than any other type and afford efficient screening in cold weather when materials tend to freeze on the screen because of improper drainage. For a copy of the Bixby-Zimmer catalog on Bee-Zee screens, circle no. 11.

PROTECTION WITH PLASTIC: Willson protective goggles and glasses are made of clear, light-weight plastic for maximum protection and wearing comfort. The various styles range from the light-duty Feather-spec to the Protecto-Shield for full-face protection. Circle no. 12.

SIMPLIFIED VENTILATION: Spiratube-M gets the maximum efficiency out of a blower or fan yet is simple to install and provides airducts requiring a minimum of maintenance. Circle no. 14.

SKIP HOISTS: The ever increasing number of Lidgerwood skip hoists on the Mesabi Iron Range indicates a conclusive solution to the rising costs involved in other methods of handling. Get bulletin M515 by circling no. 13.

INCREASED OUTPUT WITH NO-TURN HAUL: Koehring fast-shuttling Dumptors are increasing hourly output over 10 percent by saving the time normally required to turn, and by providing fast, easy spotting and one-second gravity dump. Circle no. 15.

SAVE THOSE BITS: Longer service from tungsten-carbide bits is possible with the Chicago Pneumatic Airleg. It provides a rigid, well-balanced support for the drill and effectively absorbs all recoil. For detailed information, circle no. 16.

NEW BLASTING BOOKS OFF THE PRESS: The latest information on Hercules' complete line of explosives and blasting supplies is contained in two books totalling 80 pages of factual data for the miner. Copies of both issues are available. Circle no. 17.

DIAMOND BIT CATALOG: Wheel Trueing Tool Company offers an informative catalog on its diamond bits, explaining the cutting power they develop to cut through any formation swiftly, accurately, thriftily, dependably. Circle no. 18.

SAFETY TUGGER: The new Joy DW-11 pistonair hoist is a powerful, versatile single drum unit powered by a 4-cylinder, 4-hp. air motor and has automatic safety brakes. Get bulletin 76-X by circling no. 19.

BETTER TROLLEY LINES OF ANY TYPE: No matter what type of trolley system you're planning, whether it's catenary, semi-catenary, or a conventional trolley overhead, check first on the Ohio Brass catalog no. 27 by circling no. 20.

MOLE HILLS OUT OF MOUNTAINS: That, in effect, is the problem of present-day low-grade mining. As a help in solving such problems, Traylor offers its bulletin 126 on the big, rugged, long-life Bulldog Gyratories. Circle no. 21.

Circle numbers and mail this card for free product literature

To get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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FILTERS FOR ALL USES: The National Filter Media Corporation specializes in the production of first class filter cloths—of materials both natural and synthetic—of all types and for all purposes. For information on the special consulting services offered by NFM, circle no. 22.

WINDBOX SEAL FOR SINTERING MACHINES: The Rowen Windbox Seal completely eliminates false air in sintering machine windboxes, lowers air volume requirements, insures a more uniform product, and makes processes involving gas concentrations economical. For further information, circle no. 23.

DUST RECOVERY PROBLEMS ANSWERED: Western Precipitation Corporation is the only organization with years of know-how in both electrical and mechanical methods of recovery. Get the full information on how this experience can be made readily available to answer any of your dust problems. Circle no. 25.

SELF-CLEANING DUST FILTER: The Turner and Haws Engineering Company's Aeroturn is an automatic self-cleaning dust collector with many advantages. Erection time is cut 50 to 75 percent; minimum plant space is required; and an exclusive blow ring cradle guarantees maximum efficiency and filter bag service. Get the Aeroturn bulletin by circling no. 26.

MINING TOOL CATALOG: A new publication No. M-7 containing application data, specifications and prices on all Kennametal carbide-tipped mining tools, including cutter and drill bits for blast holes and roof bolting, rock bits, open pit bits, augers, adapters, drive sockets and roof pinning rods, may be obtained by circling no. 33.

MINE HOIST COMMUNICATION SYSTEM: A new frequency-modulated carrier communication system for mine hoists has been announced by Mine Safety Appliances of Pittsburgh. Called the Hoistphone, the new unit is designed to maintain two-way conversation between the hoisting engineer and the cage. System operates at any level or when cage is in motion. For further information circle no. 34.

NEW TUBE MILL CATALOG: Hardinge Bulletin No. 18-B describes complete line of tube mills for grinding and pulverizing, including application and construction of the Hardinge pebble tube mill and the Hardinge ball tube mill. Circle no. 35.

SLYVER-CLAD BATTERIES FOR MINING: New brochure, ML-566, issued by C & D Batteries of Conshohocken, Pa., covers engineering specifications and applications for improved lead-acid type storage batteries for mining. Circle no. 36.

NEW VERTICAL AGITATOR DRIVES: Special bulletin issued by Western Gear Works of Seattle covers complete line of vertical agitator drives for application on any type of metallurgical or chemical agitator tank. A special feature is that the driving motor is an integral part of the unit which offers space saving advantages over the usual right angle drives. To obtain copy of bulletin circle no. 37.

RUGGED WAGON DRILL: The rugged tubular chassis on which the Chicago Pneumatic G-300 wagon drill is mounted gives the rig rigidity and strength without excess weight and without undue vibration. For full details on the G-300, circle no. 1.

DUSTLESS BATCH BLENDER: The four-way mixing action of the Sturtevant Blender produces a perfectly mixed product with no loss of material. This blender is designed for low maintenance, long life, and quick, easy cleaning. To get further information, circle no. 2.

HEAVY-DUTY BULLDOZER: A new contribution to heavy-duty bulldozing has been announced by Baker Mfg. of Springfield, Illinois, in the form of its big new 15X unit. The machine integrates the Baker "roll-action" blade and the frame of the 109 drawbar hp. Allis-Chalmers HD-15 tractor. A folder illustrating the operational and portability advantages of "no-pushbeam" design may be obtained by circling No. 38.

V-BELTS FOR HIGH CAPACITY JOBS: High capacity belts for especially tough jobs are described in an Allis-Chalmers bulletin No. 20B7786. According to the bulletin, high-capacity Texrope V-Belts carry 40% greater horsepower rating, are oil resistant and static conducting. Copies may be obtained by writing to A-C at 985 S. 70th St., Milwaukee, Wisc., or by circling no. 39.

SCREW CONVEYORS AND SCREW FEEDERS: Comprehensive information giving engineering and application data for a wide variety of ores and materials is the subject of a new 92 page book No. 2289 issued by the Link-Belt Co. To obtain a copy circle no. 32.

BIGGER PAYLOADS: Double-trailer or truck-trailer combinations with overall capacities up to 45 tons or more are possible with the bodies and trailers built by Easton Car and Construction Company. The versatility of these units make them adaptable to nearly any haul job. Circle no. 3.

SLURRY PUMPING PROBLEMS? If you have, the Georgia Iron Works Company had you in mind when they designed a completely new line of pumps specifically built to handle high pulp concentrations of finely-divided, abrasive materials. Circle no. 41.

NEW FINES HANDLER: Equipment Engineers now makes three sizes of their new Centriclone—a classifier that combines the best features of a cyclone and a centrifuge. Sharp classification below 65 mesh can be efficiently maintained, and overflow particles can be held below 5 microns in size. Circle no. 5.

ATTRITION MACHINE INCREASES RECOVERY: By effectively removing stubborn clays, oxides, and other cementing materials before flotation circuits, Western Machinery Company's new attrition machines are increasing the recoveries realized in many milling operations. Circle no. 6.

IMPROVED GYRATORY: Kennedy-Van Saun's new high-torque, non-clogging gyratory will efficiently handle tough rock with as much as 50 percent clay. Get the full information on this new development by circling no. 4.

EAGER DRIFTER: That's what Gardner-Denver calls their 3½-inch 93. It's a new machine for which is claimed the power and performance of the usual 4-inch drifter. Bulletin DD-2 gives complete specifications. Circle no. 40.

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WORLD'S LARGEST TRUCK TO BAGDAD COPPER

Dart unveils 60-ton, 12-wheeled, twin Diesel-engined giant truck at Golden Anniversary Party as first of six for western open-pit mine

The world's largest truck, Dart Truck Company's new 60-ton Model "Sixty" was demonstrated for members of the press and suppliers of component parts in Kansas City, Missouri February 20. The unit is the first of six scheduled for delivery this year to the Bagdad Copper Corporation, Bagdad, Arizona.

In the field of transportation, someone is always building something bigger, better, or longer than anyone else. Dart bases its claim to "world's largest" on total tire capacity less net weight. It is a fact that no pneumatic-tired haulage unit of greater capacity than this new Dart is currently operating in the mining industry, and mining uses the largest trucks available.

Feeling that the limit in scaling up of conventional designs had been nearly reached, Dart engineers incorporated such major changes as dual front wheels, front end mounting on an hydraulic strut, wagon-type power steering, full box section frame, midship mounting of engines, off-center cab, and others.

The two 350-horse-power, Buda super Diesel engines are mounted, one on either side, about amidship of the truck frame. The location provides accessibility for ease of maintenance and improved visibility for the driver.

Power is transmitted from each engine to one of the rear axles through a three-stage, Twin Disc torque converter with a five-to-one torque multiplication and downhill braking features. Transmissions are Twin Disc reverse boxes with one-to-one forward and reverse ratios.

Front end suspension is particularly unusual. Mounted on an hydraulic strut somewhat similar to the arrangement used on the landing gear of aircraft, the front end is suspended on a cushion of captive air. This provides an almost friction-free center swivel on which the front axle can turn.

See illustrations and specifications (box) for additional details.

Performance Convincing

The Model "Sixty" was put through its paces, briefly, under demonstration conditions at a gravel pit near the city. The load was approximately 75 tons of fine, wet gravel, and the roads were typical of those found in the average quarry. Rain had softened the surface and permitted the loaded truck to sink from two to four inches in places.

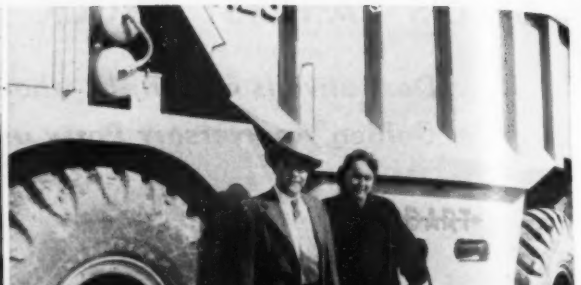
The load was driven from the bottom of the pit, up a short, but rather steep, grade, onto a relatively soft open area. A right-angle turn at the foot of the grade held approach speed to perhaps four miles per hour. A constant gain in speed for the 250 feet of rise was sufficient to require decelaration at the top. Application of power seemed very smooth—typical of units powered through torque converters—and, despite the soggy surface, there was virtually no slippage.

Exact turning radius was not checked during the demonstration, but it appeared to be no greater than that of most 40- and 50-ton units now used in mining. Ease of steering was demonstrated by a 100-pound woman driving during one of the turns.

One major problem in designing a big truck was to get adequate tire capacity to support the weight. This seems to have been accomplished by the use of the dual front wheels. The 12, 32-ply tires have some capacity above the rated gross weight of the unit in addition to the safety factor built into the tires by the manufacturer.

The dumping hoist, usually another point of difficulty, seems to be adequate, and a relocation of the usual point of lift aided in solving this problem. The demonstration overload was dumped without diffi-

LEFT: The new Dart model "Sixty" end dump truck with a 60-ton payload. Many design features are completely revolutionary in this big unit which weighs 120 tons loaded, is 11½ feet high, and 32 2/3 feet long. RIGHT: Twin hydraulic hoists, rated at 130,000 pounds of push at 1,000 pounds per square inch, raise the body for dumping.



LEFT: This picture shows the unusual mounting of the engines. Each of the two Buda, 350-horsepower, 1125 Diesel engines are set outboard of the frame and just ahead of rear wheels. Each engine powers one of the rear axles through a Twin Disc, three-stage torque converter with five-to-one torque multiplication and downhill braking. RIGHT: Ernest Dickey, general manager, Bagdad Copper Corporation, and his wife, Ione, stand beside the giant truck to give an idea of its size.

culty, but tires and hydraulic hoists will probably continue to be among the major factors limiting further capacity expansion.

A Victory Party

Dart entertained its guests at lunch—a luncheon that might be likened to a football victory banquet if restraints born of experience, wisdom, and caution could be applied to football banquets. Ralph Kress, executive vice president of Dart, said, "He is the man with the vision, courage and confidence that made it possible to go forward with the development of this revolutionary haulage unit," as he introduced Ernest Dickey, general manager of Bagdad Copper.

Mr. Dickey congratulated Dart and the various suppliers of components on their work and added, "I'm looking forward to the 100-ton model." None dared to suggest that he wouldn't get it—soon.

Delivery plans are almost as interesting as those of design and construction. Rail haulage would be both difficult and expensive. Driving over the highways is prevented by state load limit laws. So, the present plan is to remove the body, load it onto a smaller truck, and drive both units to Arizona.

SPECIFICATIONS–DART MODEL "SIXTY" TRUCK

Dimensions:

Overall length, 32 feet 8 inches; Overall width, 11 feet 8½ inches; Overall height, 11 feet 6 inches.

Weight:

240,000 pounds gross, 96,000 pounds net.

Engines:

Two Buda 8 DAS–1125 Diesel engines. Total, 700 hp. gross. Each engine powers a rear axle through separate torque converters.

Torque Converters:

Twin-disc 3-stage with 5-to-1 torque multiplication and downhill brake features. Each is charged with Diesel fuel supplied from the fuel tank. The converter fluid (Diesel fuel) is circulated through a heat exchanger for cooling.

Transmissions:

Twin-disc reverse box with 1-to-1 forward and 1-to-1 reverse ratios.

Steering:

Twin double-acting hydraulic boosters providing 56,000 pounds steering effort.

Brakes:

9- by 20-inch-diameter brakes on all axles. 2,550 square inches total brake lining area.

Hoists:

Twin hydraulic hoists rated at 130,000 pounds push at 1,000 pounds per square inch hydraulic pressure. Hoists have built in snubber and pull-down mechanism.

Frame:

Full box section 27 inches wide by 19 inches deep with ¾-inch top and bottom plates and ⅝-inch side plates. Extra reinforcement in highest load positions reduce stress.

Front Axles:

85,000-pound capacity. Cast of high-alloy steel; axle has center pivot to allow axle oscillation over irregular terrain.

Rear Axles:

Tandem rear axles–85,000-pounds capacity each. Triple reduction featuring 5:1 reduction in planetary wheel. Overall reduction of axle may be 12:57:1, 15:23:1, or 20:6:1 to provide ratios for complete coverage of operating conditions. Cast of high alloy steel.

Tires:

18.00 by 25, 32-ply dual tires on all axles. Total of 12 tires which give a tire capacity of 244,200 pounds maximum rating.

Cooling System:

34-gallon liquid cooling capacity for each engine. Engines are connected to the radiators by brass tubing. Each radiator has 118,432 square inches of radiation to dissipate engine and torque converter heat.

Hydraulic System:

Operated by two vane-type hydraulic pumps with a capacity of 144 gallons per minute at 1,000 pounds per square inch. The system is used for power steering and hoisting body. One pump is connected to each engine; therefore, the system is active with one engine stalled.

U. S. Mining Men

(*Continued from page 47*)

Steel Corporation and will be responsible for operations of company-owned iron ore and coal mines in the West.

Lloyd L. Austin, Los Angeles banker, is a new director of American Potash & Chemical Corporation. Mr. Austin was named to the board following the resignation of **Russell W. Mumford,** who continues as vice-president and consulting engineer in the Los Angeles office.

L. D. Curtis, chief electrician of the Magma Copper Company in Superior, Arizona, has retired after 28 years of service to the company.

Wray D. Farmin has been named chairman of the mining bureau of the Spokane Chamber of Commerce. He is a director of Day Mines, Inc., a Wallace, Idaho firm.

Howard E. Poland has accepted an appointment as safety instructor with the Accident Prevention Branch of the U. S. Bureau of Mines at Phoenix, Arizona. For the past five years he has been superintendent of the Frances Mining Company at Fairmont, West Virginia.

Frank Scarr, previously assistant controller of Kaiser Steel Corporation, will now be assistant to the vice president in charge of operations.

Vernon F. Taylor has been elected a director of American Zinc, Lead & Smelting Company, succeeding the late **Chester G. Breining.**

Obituaries

Nels K. Anderson, 53, died February 6 in Los Angeles. Mr. Anderson was president for 32 years of the Alloy Steel & Metals Company, and was well-known and regarded throughout the mining fraternity in connection with his company's development of Pacific scrapers and allied mining products. He served on the advisory committees of the National Steel Foundation and was chairman of the Western Division of the Steel Founders Society for many years.

George Hail Austin, 77, died February 14 at the old Weber mine near Lakeview, Idaho. He was president and manager of New Rainbow Mining Company, which is reopening the historic silver-lead-zinc property, and had gone there to inspect progress.

George T. Geringer, 70, died January 22 in the Philippine Islands. He had contracted Parkinson's disease during the occupation, and up to the time of his death was superintendent of mines in the Masbate and Baguio districts. He was the thirteenth mining engineer to be licensed in the Philippines.

R. H. "Pat" Stewart, 78, died recently in Vancouver, British Columbia. He was general manager of Consolidated Mining & Smelting Company until his retirement in 1916, and more recently was a consulting engineer.

William W. Wells, 51, died February 3 in Portsmouth, Ohio. He was chief of the engineering and construction division of the Atomic Energy Commission's Portsmouth area, and had been assigned last August to direct the construction of the $1,219,000,000 uranium plant being built in Pike County.

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Court Recognizes Mineral Rights As Separate Estate

An important decision for the state's mining industry was handed down by the Washington State Supreme Court which held that reserved mining rights in Washington constitute a separate estate which cannot be lost by failure to pay taxes unless there is a separate assessment of taxes against them.

By a seven to two decision, the court reversed a decision of a Pend Oreille County Superior Court which had ruled in favor of a landowner who brought suit to quiet title to subsurface mineral rights. The plaintiff had contended that heirs of the original land owner, who reserved mineral rights when selling to a lumber firm, had lost title by failing to pay any share of the property taxes for 34 years.

Affected by the decision was Jim Creek Mines, Inc. of Spokane, which was opening a promising surface lead-zinc deposit on the property eight miles northwest of Ione in the Metaline mining district. It suspended development work when the ownership question arose and started a new exploration program on adjoining claims it had staked. An incline shaft has since been sunk 100 feet on an ore showing uncovered by bulldozer. Good lead-zinc-silver values have been opened in crosscutting and drifting on the 50-foot level and the shaft is being deepened to the 180-foot point for establishing of a new 150-foot level. Development ore is stockpiled. Current work is under a $47,500 DMEA contract. Val Y. Preston, Spokane, is president and manager.

Hanna Nickel Project Developing In Oregon

Development of the nation's most important deposit of nickel will be undertaken by two subsidiaries of the M. A. Hanna Company at Nickel Mountain near Riddle, Oregon. The Defense Materials Procurement Agency has agreed to underwrite the project and to advance up to $24,800,000 for construction of the nickel smelter. A contract has already been let to the Bechtel Corporation for design, engineering, and construction of this smelter.

The open-pit mine, which will be developed at company expense, is estimated to cost about $4,300,000 to bring into production. When in operation in 1954, it will produce from 95,000,000 to 125,000,000 pounds for nickel for the government. The DMPA will buy the ore at $6.00 per ton, with a nickel content of 1.5 percent (the average grade indicated by test drilling). The smelting company will then convert the ore to ferronickel ingots at a cost not to exceed 79.39 cents per pound for the first 5,000,000 pounds and 60.5 cents thereafter.

The top of 3,300-foot Nickel Mountain must be stripped of several million feet of timber before mining can begin. Heavy road construction is necessary for removal of the timber and to permit hauling of heavy mining and crushing machinery to the peak where the two orebodies are located. The company reportedly has purchased Glenbrook Farms acreage about four miles southwest of Riddle as the site for the smelter and for housing. Ore will be transported by belt conveyor for a distance of more than two miles from the mine to the smelter. Electric power requirements will be supplied by the California-Oregon Power Company to operate the four primary furnaces, two auxiliary furnaces, and one refining furnace. The smelter will be on a 24-hour basis and will utilize the Ugine process, a new French method on which Hanna will pay royalties.

Sunshine Mining Reopens Idaho Antimony Plant

Sunshine Mining Company has reactivated the antimony plant it constructed during World War II in Shoshone County, Idaho, and closed after a production of 700 tons within 16 months. Cessation of activities occurred in January 1944 because of an increase in the lead content of the ore mined which required conversion of the Sunshine mill to a lead circuit.

Two principal reasons have brought about the reactivation: smelting rates have increased due to the tetrahedrite content of the bulk concentrate produced at the property; and the tetrahedrite concentrate was not readily marketable because of its relatively high antimony content. Changes in the mill circuit are expected to separate most of the silver, copper, and antimony. The antimony would then be removed in the reopened plant.

Tetrahedrite concentrate is leached in hot sodium sulphide to dissolve the antimony which is precipitated electrolytically and recovered as granular cathode antimony. Arsenic and other impurities then are removed.

Gibbonsville Mining and Exploration Company has started milling operations at its new 400-ton flotation plant in the Coeur d'Alene river valley two miles west of Kellogg, Idaho. The plant was built last fall but start of operations had to await thawing of river bank material. The plant will recover lead, zinc, and silver from tailings carried down the river from early-day milling in the Burke-Wallace area and deposited in a settling basin now covered by two placer claims. The DMPA has guaranteed the firm 15½ cents a pound on zinc and 15 cents a pound on lead production until a $62,000 RFC mill construction loan is repaid. E. E. Eddy is mining engineer in charge.

Highland-Surprise Consolidated Mining Company is making progress on a major exploration program at its Pine Creek district property in the Coeur d'Alene mining region of Shoshone County, Idaho. The main shaft is nearing the new 1,900 level objective and 1,800 feet of tunneling have been completed on the 1,300 level. A new vein structure was intersected 500 feet south of the main Surprise vein. Henry C. Smith of Spokane, vice president, is acting mine manager.

REOPENING THE CRESCENT SILVER MINE

The new ore-waste bin and dump trestle pictured above have been built by the Bunker Hill and Sullivan Mining and Concentrating Company at the Crescent mine which is being reopened after a 10-year shutdown. The former silver producer is located on Big Creek in the Coeur d'Alene mining district of Idaho, on ground adjoining Sunshine Mining Company's property. Waste from clean-up operations is dumped from the trestle down the hillside into the bin. From there, it is trucked to a new dump site down the canyon, because there is no more available dumping space near the portal. In the mine, the old Hooper Tunnel has been rehabilitated for a distance of 3,500 feet to the 1,285-foot shaft. The shaft headframe has been repaired and other preparations made for unwatering lower levels. The company is planning a new exploration and development program.

In Blaine County, Idaho, *Triumph Mining Company* won its fight against a heavy water flow which broke into the mine on the bottom, 1,000-foot level. A 2,000-gallon-per-minute pump completed unwatering started by two smaller pumps. Plans called for construction of a sump and permanent pumping station. Production was under way again from upper levels and clean-up work was progressing on the 900 and 1,000 levels. Lewis Robison is general manager.

Snoose Mining Company is shipping ore being mined from a vein in a new winze from the 200-foot level of its Blaine County, Idaho mine. Plans called for carrying the winze down 300 feet.

The old *Hercules* mine shaft at Burke, Idaho will be deepened more than 300 feet to open a new 1600 level and to carry out lateral work therefrom. Work will be done under a $242,860 DMEA lead-zinc exploration contract. *Day Mines, Inc.* of Wallace, has been carrying on an extensive development program from the 1,200 bottom level of the Hercules since unwatering it several years ago.

Lead and zinc price declines have forced postponement of a proposed diamond drilling program at *Idamont Lead-Zinc Mines'* 86-claim *Idamont* group in the Moyie-Yaak district of Boundary County, Idaho.

A siderite vein carrying good silver values in gray copper was intersected on the 3,000-foot level of the *Vulcan* (old Galena mine in Lake Gulch, two miles west of Wallace, Idaho in the Coeur d'Alene mining region. Ore previously developed was lead-silver type. *American Smelting & Refining Company* started its deep exploration program in 1947 under a long-term lease and profit-sharing agreement with *Vulcan Silver-Lead Corporation*, subsidiary of *Callahan Zinc-Lead Company*, which more than 20 years ago mined galena from the property to a depth of 1,600 feet. *Day Mines, Inc.* and *Federal Mining and Smelting Company* have 25 and 15 percent interests in the ASARCO lease. A wide zone of galena mineralization has been under development on the 3,000 level and a raise has been completed to a new 2,800 level. Production has been limited to low-grade development ore. J. E. Berg of Wallace is manager of ASARCO'S northwest mining department.

Clayton Silver Mines had completed deepening of the shaft at its property in Clayton, Idaho to the 550-foot level when the base metal price situation virtually halted operations. The crew has been reduced 25 percent, and underground operations are confined to preparations for crosscutting to lead-zinc ore bodies on the new level. Norman M. Smith of Kellogg is directing engineer.

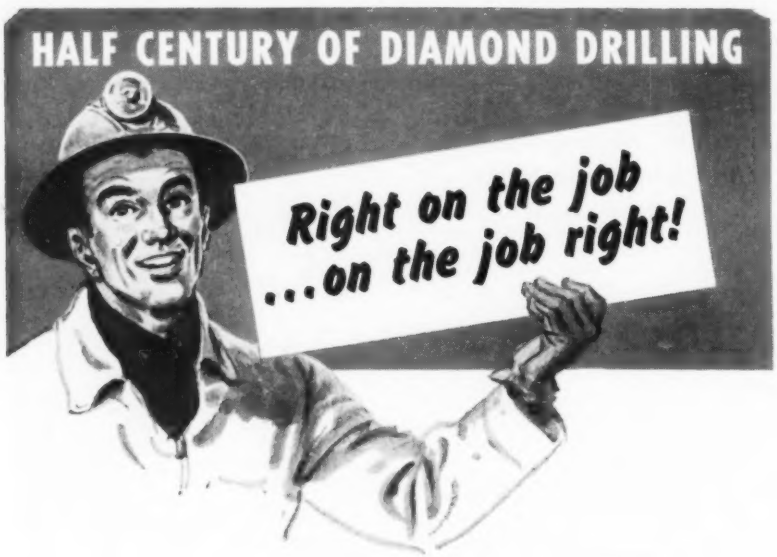
Contractors, drifting in the north surface tunnel at East Hypotheek, made 72 feet in 14 working days, or over five feet per day average at the property of *Hypotheek Mining and Milling Company* in the Pine Creek district of Idaho. The tunnel follows a small, mineralized vein and is penetrating a specific area of altered rock considered favorable. The 300 level from the shaft extends westerly beneath the present face, and old records of the company show the 300 west drift to be in high-grade lead-zinc ore. A short shoot of ore was opened from the north surface tunnel, which is being extended under a $70,000 DMEA contract. Arrangements have been made, independent of the DMEA contract, to pump out the 300-foot shaft and level of examination. A pumping test is scheduled to determine how fast the shaft fills when pumped down. Old records indicate that former operators were flooded out after opening commercial zinc-lead values. Roy Kingsbury of Wallace is secretary.

Nabob Silver-Lead Company, in the Pine Creek district of the Coeur d'Alenes, Idaho, is starting full-scale production. Ore is to be mined from four faces, two on the mill level adit and two in upper workings on the Denver structure. A 375-foot service and ventilation raise has been holed through from the mill level adit to the No. 9 level of the old Denver shaft. C. C. Dunkle is vice president and manager.

Whitedelf Mining and Development Company has completed its shaft deepening project at Clark Fork, Idaho, and is cutting a station, skip pockets, and sump preparatory to opening a new 800-foot level. The shaft was deepened 400 feet to the 843-foot point. About 1,000 feet of crosscutting and drifting is expected to intersect lead-silver ore disclosed in diamond drilling by the U. S. Bureau of Mines during World War II. Compton I. White, Jr. is manager.

Diamond drilling in the *Sidney Mining Company* property on Pine creek in the Coeur d'Alenes, Idaho has located the displaced Sidney ore structure on the 1,000 level. Zinc-lead-silver ore was cored over a width of 7 feet. Malcolm Brown of Kellogg is general superintendent.

A station and ore pockets have been cut for a new No. 10 level in the *Little Pittsburg* mine, also in the Pine Creek district, Idaho. Good-grade ore is being taken from the present No. 9 bottom level. Mine output varies from 50 to 65 tons daily, and mill production from 150



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to 175 tons of zinc concentrate and 50 tons of lead concentrate monthly. *Mascot Mines, Inc.* is operating the property under lease from *Pine Creek Lead-Zinc Mining Company*. Dunham Bell is vice president of Mascot.

American Smelting and Refining Company dropped its option on the *Silver Buckle Mining Company* property adjoining its *Vulcan* project just west of Wallace, Idaho, in the Coeur d'Alene mining region. AS&R spent about $85,000 on surface exploration of Silver Buckle ground, including a 1,500-foot crosscut and 20 miles of bulldozer trenching. AS&R had an option to purchase 6,700,000 shares (67 percent) of Silver Buckle stock. In return for exploration and other expenditures aggregating $160,000, AS&R obtained surface rights to 155 acres of Silver Buckle ground north of the Vulcan shaft, together with an easement for a shaft and underground workings.

Golconda Lead Mines of Wallace, Idaho, is making good progress rehabilitating long-flooded lower levels of its mine preparatory to crosscutting under new ore-shoots opened from the 1150 winze level. A switching tail drift has been completed on the bottom (1800) level and retimbering was being done on a three-shift basis. One shift was doing similar work on the 1600 level. Wray Featherstone is mine manager.

Gates Brothers, Inc. are making plans to build a triple-superphosphate plant at a cost of over $2,000,000 in the western part of the United States. The company already operates a fertilizer plant at Wendell, Idaho. An agreement has been made with the *Ralph M. Parsons Company*, an engineering and contracting firm, whereby the two companies will combine to build phosphate fertilizer plants throughout the world. The Gates firm has developed, and is operating, a modern high analysis fertilizer plant where full use has been made of continuous processing techniques, requiring about three hours time from raw rock to finished product. The construction company will engineer and build the wet phosphoric acid plants and triple superphosphate plants based on the Gates design.

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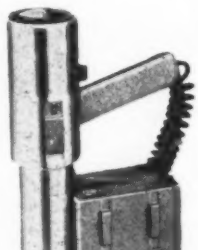

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MONTANA

The *Willow Stick Mining Company* has been incorporated in Boise for $122,000. Three Seattle men were the incorporators: John W. Sperling, Stephen F. Chadwick, and Stephen F. Chadwick, Jr.

A step-up in production to 1,500 tons monthly this year from the 1952 average of 456 tons is planned by *Mitchell Mining Company* at its *Margaret Ann* mine just north of Walkerville in the Butte, Montana area. January output reached 1,050 tons. The two-compartment shaft has reached the 400 level and development of 300 and 400 levels has shown improving gold-silver values and vein widths with additional depth. Average grade of 1952 output was 0.2382 ounce of gold and 25 ounces of silver to the ton for a gross value of $173,956. The company also has sunk an incline shaft 200 feet on the *Florida* claim in shipping-grade manganese-silver-gold ore, and has optioned several other properties in the area. Ralph Seideman is engineer and mine manager.

Diamond drilling at *Elkhorn Mining Company's* Armstead, Montana, thorium-rare-earth prospect will be resumed this spring under a DMEA exploration loan. The firm's new modern patient reception building and elevator installation at the *Free Enterprise* uranium mine at Boulder, Montana, has been paid for, and the mine is ready for the reception of visitors suffering from arthritis and other ailments.

C. R. Oliphant and associates have been making shipments of surface ore from the old *Cumberland* mine near White Sulphur Springs, Montana. In 1951, a Spokane mining firm ... unsuccessfully to find new ore ... in old underground workings of the early-day silver-lead producer.

An engineering crew of *Anaconda Copper Mining Company* is at work near Columbia Falls, Montana preparing the site for erection of the new aluminum plant there. First buildings to be constructed are a warehouse, machine shop, and change house. Building is to continue throughout the winter under cover, and the first aluminum may be produced in 1954.

The *Merry Widow* mine near Basin, Montana, one of the so-called "arthritis mines," has filed articles of incorporation. Directors are W. W. Durnen and Rose Durnen of Cody, Wyoming, and Alfred Hedval of Basin.

OREGON

Pacific Minerals, Inc. of Kellogg, Idaho is planning a diamond drilling program this season at a Douglas County, Oregon, copper property it acquired last summer. The work would test the downward extension of a structure which yielded some production to former operators. If satisfactory results are obtained, a lower tunnel would be driven to open the deposit. Last fall about 100 feet of drifting was done along a vein which carried copper-zinc-silver-gold values. A ½-cent-a-share assessment has been levied to finance the proposed new work. Wayne A. Brainard of Kellogg is president of the firm, successor to *Modern Prospectors, Inc.*

WASHINGTON

American Zinc, Lead and Smelting Company has boosted mechanization at the *Grandview* mine near Metaline Falls, Washington to 100 percent by installing a second Diesel-powered combination mucker, transport and drill jumbo invented by Dale I. Hayes of Spokane, the company's western manager. The machine has increased production from 14 tons per man-shift to 103 tons. An electric-powered model is in use and an all-purpose development machine.

Grandview Mines of Spokane has found zinc-lead ore in three drill holes on ground adjoining the *Anderson* open-pit mine of *Goldfield Consolidated Mines* in the Northport district of Stevens County, Washington.

Sales of unpatented mining claims in the state of Washington are not subject to county real estate sales taxes, according to an opinion of the state attorney general's office. The opinion was sought by Pacnor Mines, Inc. of Spokane in contesting an attempt of Pend Oreille County to tax mining claims which it had taken over from *JAT Syndicate* of Spokane. The claims are in the Russian Creek sector of the Metaline mining district. Karl W. Jasper of Spokane is secretary-treasurer of Pacnor.

COLORADO'S SAN JUAN HARD HIT WHEN SHENANDOAH AND CAMP BIRD CLOSE

The Shenandoah-Dives Mining Company closed its mine and 700-ton-per-day differential flotation mill on March 15. The mine had been in continuous production since 1928, except for several short intervals when a labor strike was in progress. It was one of the few Colorado mines to maintain operations through the depression in the late 1920's and early 1930's.

Closing of the mine was forced by the continuing series of zinc and lead price reductions which caused a monthly loss from $10,000 to $25,000. In 1952 the mine produced 4,230 tons of lead and 1,951 tons of zinc, and appreciable amounts of copper, silver, and gold.

Under the able management of Charles A. Chase, executive vice president and general manager, the company has done one of the industrys outstanding jobs in mechanization of mining, and in holding costs to a minimum for hard rock steeply dipping narrow vein mining. Over 4,000,000 tons of ore have been mined and almost 4,500,000 tons milled as the mill has operated as the most important custom mill in the San Juan district for a number of years. Operating costs for milling 196,097 tons in 1951 (last year published) per ton were: mine development, $0.2694; mining, $2.9082; milling, $1.8293; tramway, $0.3462; general and overhead, $0.1904 for a total of $5.5435. Net smelter returns were $7.38 per ton. The ore averaged 0.04 ounce gold, 1.7 ounces silver, 1.25 percent lead, 0.25 percent copper, and 0.47 percent zinc per ton.

The company has applied to DMEA for an exploration loan with equal company participation to drive a 1,400-foot-long crosscut to the Letter G vein.

Closing of the Shenandoah-Dives mill will adversely affect many small operators in the district who have marketed their ores at the mill. Custom shipments normally increase in the summer and have amounted to as much as 150 tons of ore per day

The King Lease, Inc., operator of the famous Camp Bird mine at Sneffels, Ouray County which operated three shifts continuously for the last 28 years, has also curtailed operations due to the low metal prices. A skeleton crew will be kept at the mine and mill to keep mine workings open. If prices go lower, operations may be terminated, according to manager Lin Barry. The Camp Bird was the source of the Walsh and MacLean fortunes. The famous Hope diamond was purchased with Camp Bird mine profits.

The Callahan Zinc-Lead Company has closed its 100-ton differential flotation mill and the Akron mine at Whitepine, Gunnison County, Colorado. James Dunn, manager, remains at the property which is being kept on a temporary stand-by basis awaiting metal market developments.

Merging Mines Propose Name—United Park City

United Park City Mines Company will be the name of a new mining company operating in the Park City district when stockholders of the Silver King Coalition Mines Company and the Park Utah Consolidated Mines Company approve merger plans completed for their approval.

The merger will unite two of the largest companies in the district and consolidate their adjoining properties under one management. Economies of operation would do much to lower operating costs and permit extension of operations. In the past several years, the two companies have conducted joint exploration programs in a block of ground in the Park Utah-Silver King-Daly Mining area.

The new company will have 6,000,000 shares of $1.00 par value stock. Park Utah stockholders will get 1.1 shares of new stock for each share held, and Silver King will get 1.25 shares in the new company for each Silver King share held.

Officers of the new company will be: president, John M. Wallace, Walker Bank and Trust Company, Salt Lake City; vice president, Frank A. Wardlaw, Jr., Utah manager International Smelting and Refining Company; vice president, D. J. Pope, general manager, Western Mining Department, American Smelting and Refining Company; secretary-treasurer, J. William Stoner, treasurer and secretary, Park Utah Consolidated Mines Company.

Directors will be James E. Hogle, Hogle and Company, Salt Lake City; James Ivers, president, Silver King; C. Jay Parkinson, mining attorney, Salt Lake City; Paul H. Hunt, vice president and general manager of Park Utah; and W. R. Landwehr, chief geologist, Western Mining Department, ASARCO.

First Permits To Explore In National Monument

The United States Atomic Energy Commission has awarded exploration permits for uranium ore in the Capitol Reef National Monument in Wayne County, south central Utah. It is the first time that prospecting and possible mining have been permitted in a national monument.

The permit grants a one-year right to prospect for uranium ores within the confines of the Mounment. Certain areas owned by the state and the counties are excluded. The entire ore-bearing formation in the Monument is considered virgin because no test drilling has been done. After a prospector makes a discovery, he locates claims and makes an application for a lease to the AEC at Grand Junction, Colorado.

Utah residents receiving the permits are:

C. V. Behunin, Salt Lake City; Lane J. Bertelsen, Marysvale; Melvin Bryan, Ogden; William G. Burgess, Hiawatha; George K. Burnhart, Kenilworth; E. V. Chettle, Salt Lake City; William Christensen and H. O. Barney, Salt Lake City; Robert N. Cooper, Salt Lake City; William LeRoy Ewell, Santaquin; Ellis Fuller, Spanish Fork; Lauren W. Gibbs, Salt Lake City; Gordon C. Harris, Garfield; John K. Hayes, Payson; Hugh Heath, Martin L. Robison, and Luther M. Robison, Tooele; Juan H. McBroom and Floyd Fattig, Moab; Lewis Lyle Jepson, Salt Lake City; Kuhn Bros., Salt Lake City; Lurton J. Knee, Torrey; LaFlorecita Mining Company, Salt Lake City; Glen A. Law, Springville; James R. Lazenby, Payson; Lyman and Lyman, Ogden; Lawrence Migliaccio, Price; Frank L. Morgan, Springville; Vernon J. Nell, Jr., Riverton; Harry S. Nielsen and LaVon Chappel, Ferron; Luella Sargent Ollerton, Marysvale; Riley R. Osborn, Torrey; Mrs. Riley R. Osborn, Torrey; Leland Shumway, Blanding; Art Vollas, Bingham Canyon; James Wilcox, Helper; and Martin L. Robison, Tooele.

Colorado residents who received permits are: Ortmayer Mining Company, Grand Junction; Vernon J. Pick, Grand Junction; Plateau Exploration and Development Corporation, Cortez; and George H. Snyder and Rex F. Smith, Durango.

The *Great Lakes Carbon Corporation* has purchased the *AleXitE Engineering Division* of the *Alexander Film Company*, according to Walter Gramm, senior vice president of Great Lakes. Included in the sale were the open-pit perlite mine at Rosita, Custer County, Colorado, and the crushing, sizing, and drying plant at Florence, Fremont County. Great Lakes will continue to operate the mine and mill, and will ship perlite to customers under its own "Permalite" trade name. Expansion plans may be considered, according to R. W. Taylor who supervised the transfer in ownership. Great Lakes will employ personnel who worked for AleXitE.

The American Smelting and Refining Company expects to complete its new Irene shaft on Johnny Hill, Lake County, Colorado within the next several months. The shaft was started from the surface in September 1952, and will connect with the top of the 650-feet-deep Irene winze on the 1,000-foot Eclipse level. The shaft was sunk 290 feet during 1952, and was 524 feet deep on February 1, 1953. J. C. Mitchell of Leadville is mine superintendent of ASARCO's Leadville mining operations.

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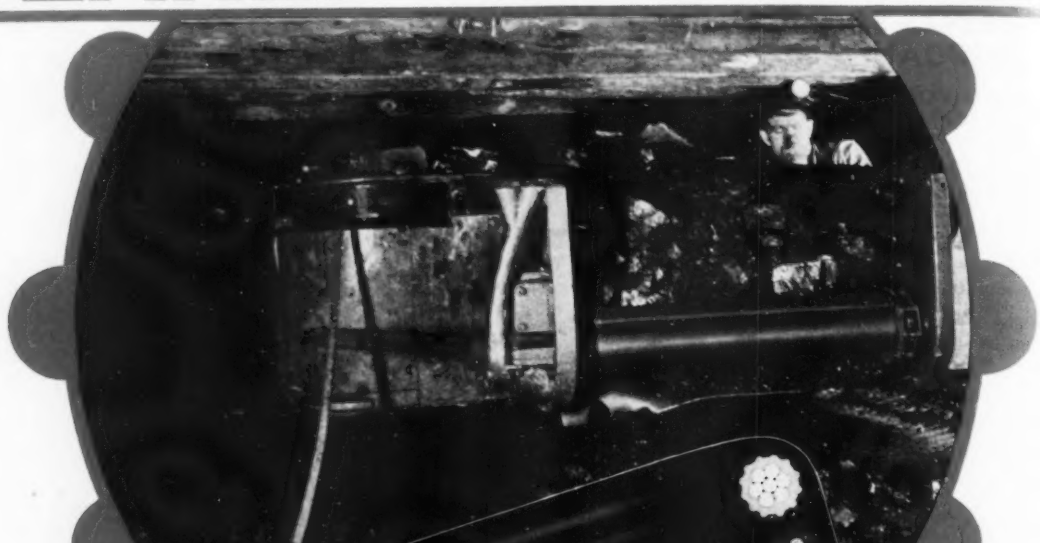

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CLEVELAND-CLIFFS BUILDING SECOND PLANT TO BENEFICIATE LOW-GRADE ORE

With the Humboldt project well under way, Cleveland-Cliffs Iron Company has started grading and blasting for the beneficiation plant at Republic, Michigan. The company has received a rapid tax write-off certificate for $26,575,500 for the new facility.

The first project for concentration of low-grade hematitic jasper in the Upper Peninsula of Michigan was a joint venture of CCI and the Ford Motor Company at Humboldt, Michigan. Shipments of ore from Humboldt are expected in mid-1954, while shipments from the new Republic operations are scheduled for mid-1956.

The Republic open-pit and concentrating mill is designed for an initial production of 400,000 tons of concentrate. Additional units will be built later which will materially increase the annual rate. The site selected for the mill is located on the east side of the orebody, or on the hanging wall. The orebody is in the form of a large knoll and three shafts of the old underground operation, the Republic mine, were sunk from the top of the knoll or bluff. On the west side of the orebody, or at the base of the bluff, a highway skirts a small bay in the Michigamme River. Present plans call for excavating the open pit to a point 200 feet below the present highway grade. The orebody lies on an incline and extends under the bay.

New Republic mine is owned and will be operated by Cleveland-Cliffs, whose metallurgists solved the problem of liberating the fine particles of hematite from the jaspers by skimming the particles as concentrates to be agglomerated later.

Electric shovels will be used in the pit to load the lean ore to trucks which will transport it to the primary crusher located at the surface. Primary crushing will be followed by screening and secondary screening and rod or ball milling. In the summer months, the concentrate will be loaded directly to rail cars, and in winter months the material will be stockpiled. The Lake Superior & Ishpeming Railroad has already completed a line to serve the new plant.

The original Republic mine, opened in 1871 as an underground operation, was noted during its productive years for a high-quality lump ore of exceptional purity. The mine reached a depth of 2,910 feet and shipped 8,563,170 tons of ore. It has been inoperative for over 25 years.

D. Kelly Campbell is project engineer in charge of the construction phase of both plants for Cleveland-Cliffs; Emmert Lindroos is supervising metallurgist.

Preparatory work is now underway on the sinking of a new shaft at CCI's Cliffs Shaft mine at Ishpeming, Michigan. The new shaft will measure approximately 13 by 20 feet, and will replace two existing shafts instead of opening new orebodies. This is the first step in a modernization program being carried out at the mine which has been in continuous production for over 60 years. Completion of the shaft, plus installation of new machinery, is not expected until some time in 1955. When finished, the new shaft will be about 1,200 feet deep. Tonnage to be hoisted through the new shaft is expected to equal that of both shafts now in use.

Steel Co. of Canada Buys Interest in Erie

The Steel Company of Canada, Ltd. has purchased a 10 percent interest in Erie Mining Company from the Youngstown Sheet & Tube Company, while the Interlake Iron Corporation has increased its interest in Erie to 10 percent. Pickands Mather & Co., managers of the Erie, report present ownership in the firm as follows: Interlake and Steel Company of Canada, each 10 percent; Youngstown Sheet & Tube, 35 percent; and Bethlehem Steel Corporation, 45 percent.

Erie Mining is currently planning a large taconite project in the Minnesota Mesabi Range.

Eagle-Picher Company has optioned property near Bismarck, Missouri, and reportedly will do some prospect drilling there soon. The land involved is that of the Matkin Brothers on Highway 32 and also the farm of Dr. F. T. Wallen. A possible extension of the southeastern Missouri lead belt may be indicated by this transaction. Eagle-Picher purchased the rights to the Frank Dunn farm on Highway 61-67 between Flat River and Farmington many years ago, and later St. Joseph Lead Company bought the south portion of the underground rights. St. Joseph now has under option about 65,000 acres in this immediate vicinity. Eagle-Picher's new interest at Bismarck is further west than any of this other activity.

The Michigan Conservation Commission recently approved the leasing of copper rights on state-owned lands in Houghton and Ontonagon counties. Copper exploration and mining rights on a total of 1,041 acres in the two counties were leased. Commissioners were told that this is the first time, as far as department geologists can recall, that such a lease has been asked. Terms called for

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50-year leases to include a three-year exploration period before minimum royalties must be paid. The rental will be 10 cents per acre per year during exploration period and at least $10 an acre must be spent for exploration during the three-year period. The state will receive five percent of the net sales price after smelting with minimum royalty to be paid set at $25 per acre per year. A private individual is leasing the property; his name was not revealed.

The *American Steel & Wire Division* of the *United States Steel Corporation* has signed contracts with *Arthur G. McKee & Company* to build the world's largest merchant iron blast furnace in Cleveland, Ohio. The new unit will have a daily capacity of 1,350 tons; will be 106 feet high; and will have a 26-foot-diameter hearth. Construction is underway and completion is expected in the spring of 1954.

Work on the $6,500,000 project of *Calumet & Hecla, Inc.* to unwater and bring back into production the *Osceola* copper mine in Houghton County, Michigan, was delayed by a 63-day strike in the copper mining, smelting, and refining operations of the firm's Calumet Division. Work is now progressing satisfactorily, however.

Calumet & Hecla, Inc. has leased quarters for its executive offices on the 20th floor of the People's Gas Building, 122 South Michigan Avenue, Chicago. Occupation of the new quarters is expected on May 1.

After 65 years of operation, the *Muscoda No. 4* mine of the *Tennessee Coal & Iron Division* of *U.S. Steel Corporation* has been closed. The mine's ore reserve has been virtually exhausted. Opened in 1888, the mine workings had reached a point about two miles from the portal and had reached a depth of 960 feet below sea level at its lowest point. Six TCI ore mines are still in operation at Muscoda and Wenonah.

The *New Jersey Zinc Company of Pennsylvania* at Palmeton, Pennsylvania, has received a certificate of necessity permitting fast amortization of 45 percent of $15,000,000 to be spent for titanium dioxide facilities.

Mining, washing, and dragline operations were resumed at the *Achan* mine of *International Minerals & Chemical Corporation* at Bartow, Florida after a temporary shutdown which lasted about three months. In addition to regular operations, third-shift dragline operations will be scheduled when required.

Manganese in the form of furnace slags will now be purchased by the *Defense Materials Procurement Agency*, in addition to ores and concentrates. The slag must meet the same program of specifications as ores and concentrates. Penalties will apply if the silica-alumina content is above 11 percent. Slag is defined in the revised regulation as "material which has been agglomerated by the application of heat above the point of fusion. Not more than 5 percent by weight shall pass a Tyler standard sieve mesh No. 20 or U.S. standard sieve No. 20."

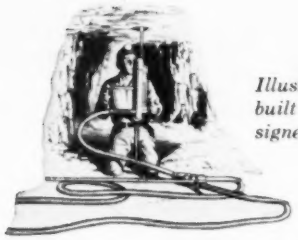
The seventh domestic [illegible]ducer of aluminum will be the *Whela[illegible]* Company of Chattanooga, Tennessee, [illegible]ich plans to build a $70,000,000 plant [illegible] the Tennessee Valley. The new facil[illegible] will have an annual capacity of not less [illegible]n 50,000 short tons of primary alumin[illegible]. Negotiations with the Defense Proc[illegible]tion Administration are expected [illegible] produce certificates of necessity for [illegible]apid tax amortization. The project will [illegible] privately financed and is expected to [illegible]rt operations late next year.

The *Defense Materials Procurement Agency's* contract with *Southwestern Engineering Company* of Los Angeles, California, for the extraction of manganese from low-grade ores has been amended to include research on Aroostook manganese ores in Maine. The original contract was for so-called "wad" ores from Virginia and Arkansas. The contract runs to April 1954 unless terminated by the government at an earlier date.

The *International Minerals & Chemical Corporation* recently authorized the moving of the executive and sales offices of the feldspar department to Erwin, Tennessee. The feldspar department was formerly the *Consolidated Feldspar Corporation* which was acquired by International Minerals & Chemical in December 1952. It is now a second department in the Industrial Minerals Division of International. R. W. Larson, president of Consolidated, will continue as general manager of the feldspar department.

In its first half year of operation, the *United States Mica Buying Depot* in Spruce Pine, North Carolina purchased $609,067.69 worth of ruby mica. This is at a rate of $1,200,000 for a full year. A new weekly record was set in January when $37,429.66 worth was purchased, setting a yearly rate of close to $2,000,000. These estimates are based upon continuance of the policy that only ruby mica will be bought; if green mica is authorized, as seems likely, the rate of purchases is expected to double. During the first half year of operation, the depot bought 40,703.86 pounds. At the end of 26 weeks, the percentages of good stained, stained, and heavy stained qualities of mica accepted by the depot ran as follows: good stained, 60.2; stained, 32.0; heavy stained, 7.2. Most of the mica is coming from mines in Yancey, Mitchell, and Avery counties. Several that have produced heavily in the past have been reopened and are getting ready to produce again. These include the *Elk* on Plumtree Creek in Avery County; the *Cloudland, Clarrissa, Spread Eagle*, and *Sink Hole* in Mitchell; and the *Presnell* and old *Autrey* in Yancey County.

The *American Zinc Company of Tennessee* has reported the following safety records from its zinc mines in Tennessee. The *Jarnagin* mine in Jefferson County worked 14 months and 132,912 manhours without a disabling injury. Paul L. Bozeman is general foreman. The *Athletic* mine in Jefferson County, has worked six years and six months and 221,020 manhours without a disabling injury. Nelson D. Heim is general foreman. *North Friends Station* mine in Jefferson County has worked 14 months and 55,467 manhours without a disabling injury. W. C. Armstrong is general foreman. The Limestone department has worked two years and seven months and 416,678 manhours without a disabling injury. B. F. Gibson is superintendent of this department.



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The Defense Production Administration has granted a certificate for accelerated tax amortization to the *Beryllium Corporation* of Reading, Pennsylvania, for 60 percent of $5,099,494 for facilities to produce beryllium alloys.

IRON RANGES

The *Northwestern Mutual Life Insurance Company* of Milwaukee, Wisconsin, has invested $10,000,000 in 4½ percent first mortgage bonds issued by *Reserve Mining Company* to raise money for development of its taconite low-grade iron properties in the eastern Mesabi Range. Reserve Mining Company, owned jointly by *Republic Steel Corporation* and *Armco Steel Corporation*, recently announced the sale of $148,000,000 of the bonds to a group of insurance companies. Total cost of the project is set at about $160,000,000, with the steel companies furnishing the difference. The jointly owned plant, and other taconite processing facilities will be at Babbitt and Beaver Bay, Minnesota. It will also have an electric power plant and a short private railroad.

The *United States Steel Corporation* has been granted a certificate of necessity permitting it to write off at the fast rate 65 percent of $60,000,000 worth of iron ore sintering facilities to be located at Two Harbors, Michigan. The Oliver Iron Mining Division is conducting engineering studies in the area of the proposed site which is near the Duluth Missabe & Iron Range Railway docks. The proposed project would be to screen out and sinter the fine material in run-of-mine ore on the Mesabi Range, aimed toward restoring the desirability and improving the quality of Mesabi ore shipped to blast furnaces. Indications are that this can best be accomplished by separating out the coarse and oversize fraction for direct shipments and agglomerating the remaining fine ores by sintering.

The Great Lakes shipping season opened at the earliest date in its history when the freighter "James Watt" docked at Buffalo, March 3. A shipment of pig iron was loaded for delivery to the *Ford Motor Company* plant at River Rouge, Michigan. The Buffalo harbor, usually ice-bound at this time of year, was clear except for some small patches of ice which did not affect docking. Officials predict the biggest season in history with this early opening. The Great Lakes Carriers Association estimates a tonnage of 106,000,000 in iron ore shipments alone on the lakes this year.

Pickands Mather & Co., acting as agents for the *Western Mining Company*, have obtained an extension of their leases on Tioga No. 1 and No. 2 from the state. These properties are located west of Grand Rapids, Minnesota. It is expected that stripping and development will commence this summer and a plant building program paralleling that being carried out at the *West Hill* mine will be instigated.

Hanna Coal and Ore Corporation is constructing a small pilot plant at its Hibbing, Minnesota, research laboratories to investigate the pelletizing of concentrates produced by the Groveland, Michigan, pilot plant. Hanna reportedly will use a grate-type furnace.

The *Bear Creek Mining Company*, a exploration subsidiary of *Kennecott Copper Corporation*, has opened a regional office in Minneapolis to direct company activities in the midwestern states from Canada to the Gulf of Mexico.

Zontelli Bros., Inc. of Ironton, Minnesota, has entered into a contract with Western-Knapp Engineering Company for the construction of an 80-long-ton-per-hour Dutch State Mines cyclone plant at the *Virginia* mine, just outside of Ironton on the Cuyuna Range. This installation will handle the minus-¾-inch, plus-65-mesh fraction of the ore, and will operate in conjunction with a 175-long-ton-per-hour Wemco Mobil Mill installed at this property a year ago. The flowsheet varies somewhat from the flowsheets of other plants being installed on the Mesabi Range. Double-deck drain screens will be used following the cyclone. The plus-

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Oliver Iron Mining Division of *United States Steel Company* has started development work on the *Plummer* mine near Taconite, Minnesota. A crushing, screening, and washing plant will be installed. The mine is scheduled to make the first shipment at the start of the 1954 season.

Railroad service to the new millsite of the *White Pine Copper Company* was established January 10th when the Duluth, South Shore & Atlantic Railroad opened a 14-mile-long branch from Bergland, Michigan.

Pickands Mather & Company is planning the installation of a crushing, screening, washing, HMS, and cyclone plant at the *Mahnomen* mine near Crosby, Minnesota, on the Cuyuna Range. Tentative plans call for this plant to handle approximately 350 long tons per hour of crude ore with first shipments to be made at the start of the 1954 season.

Cleveland Cliffs Iron Company has major construction programs under way at three properties on the Mesabi Range in Minnesota. At the *Hill Trumbull* mine, a two-circuit Dutch State Mines cyclone plant is being installed to handle the concentration of the minus-¼-inch, plus-65-mesh fraction of the feed. This plant will serve as an adjunct to the present 400 long-tons-per-hour HMS plant used for treating the plus-¼-inch material and the Humphreys spirals installation that will treat the minus-65-mesh material. The new section is nearly complete, and is expected to be ready for operation at the opening of the 1953 ore season. Hugh Leach is superintendent at the Hill. At the *Hawkins* mine, near Nashwauk, Minnesota, a second section is being built on the HMS plant, and work has been started on a two-circuit DSM cyclone plant similar to that being installed at the Hill Trumbull. The new heavy media section is expected to be ready for the start of the 1953 ore season, but the cylcone section probably will not be ready until about the middle of the season. Paul P. Swanson is superintendent at the Hawkins. At the *Canisteo* mine, near Coleraine, Minnesota, Cleveland-Cliffs is installing a plant to treat the fines from the tailing pond. This plant will also handle classifier overflow from the current wash plant production. Consisting of hydrosizers and Humphreys spirals, this plant is expected to be ready for production at the start of the 1953 ore season. In addition to the above plant expansion program Cleveland Cliffs is expanding the facilities of its research laboratory at Taconite, Minnesota. Floor space is being increased by about 30 percent and additional equipment is being installed to permit an expanded research into the problems of beneficiation of low-grade iron ores.

Survey of Iron Range Beneficiation Plants

HMS Plants Starting Operation In Lake Superior Region During 1952 Season

Company	Mine	Rated Capacity[1]
MINNESOTA		
Mesabi Range		
Cleveland Cliffs Iron Co.	Hawkins	200
Coons Pacific Co.	Eveleth, Minn.	175
Hanna Ore Mining Co.	Mesabi Chief	400
Mesaba Cliffs Iron Co.	Lake Concentrator	200
Cuyuna Range		
Zontelli Bros.	Virginia	175
MICHIGAN		
Marquette Range		
Cleveland Cliffs Iron Co.	Ohio	175

1. HMS feed in long tons per hour.

Dutch State Mines Cyclone Plants in Operation on Mesabi Range During 1952 Season

Company	Plant	Rated Capacity[1]
Hanna Ore Mining Co.	Buckeye	125
Mesaba Cliffs	Holman	60

1. Cyclone feed in long tons per hour.

Dutch State Mines Plants Under Construction on Mesabi Range for 1953 Operation

Company	Plant	Capacity[1]
Butlers Bros.	Harrison	125
Cleveland Cliffs	Hawkins	160
Jones & Laughlin	Hill Annex	125
Mesaba Cliffs	Hill Trumbull	160
Zontelli Bros.	Virginia	80

1. Cyclone Feed in long tons per hour.

HMS Plants Under Construction on Minnesota's Mesabi Range for 1953 Operation

Company	Mine	Rated Capacity[1]
Cleveland Cliffs Iron Co.[2]	Hawkins	200
Pickands Mather & Co.	West Hill	200
Pickands Mather & Co.	Biwabik	175
Skubic Bros.	Virginia	175

1. HMS feed in long tons per hour. 2. second section, increasing total plant capacity to 400 long tons per hour.

HMS Plants in Operation in Lake Superior Region Prior to 1952 Season

Company	Plant	Rated Capacity[1]
MINNESOTA		
Mesabi Range		
Butler Bros.	Harrison	200
Butler Bros.	Patrick	400
Cleveland Cliffs	Canisteo	200
Hanna Ore Mining Co	Buckeye	175
Jones & Laughlin[2]	Hill Annex	400
Jones & Laughlin[2]	Grant	125
Mesaba Cliffs	Hill Trumbull	400
Mesaba Cliffs	Holman Cliffs	400
W. S. Moore Co.	Prindle	175
Pacific Isle	North Uno	100
Rhude & Fryberger	Pennington	125
Stanley Mining Co.	Mary Ellen	175
Cuyuna Range		
Hanna Coal & Ore Corp	Moroco	175
MICHIGAN		
Gogebic Range		
Zontelli Bros.	Penokee	125

1. HMS feed in long tons per hour. 2. Dismantled winter 1952-1953; 200-long-tons-per-hour-capacity being moved to edge of pit. Remaining section to be installed at Greenway mine for 1955 operation. 3. Dismantled winter 1951-1952 and being moved to Schley mine for 1954 operation.

Concentrating Plants Other Than HMS or Cyclone Under Construction in Lake Superior Region

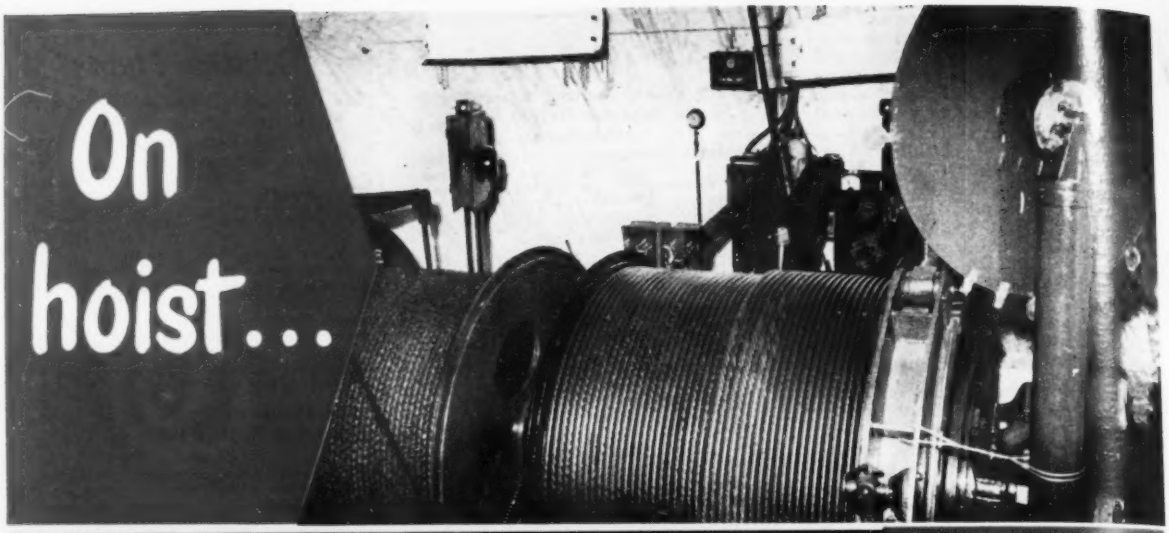
Company	Plant	Type	Estimated Starting Date
Cleveland Cliffs	Canisteo[1]	Hydrosizers, Humphrey spirals	Spring—1953
Cleveland Cliffs	Humboldt[2]	Flotation	Fall—1953
M. A. Hanna	Carlz[1]	Hydrosizers, wash	Spring—1953
M. A. Hanna	Morton[1]	Wash	Summer—1953
Oliver Iron Mining Div.	Ht. Iron[1]	Magnetic taconite concentration	Fall—1953
Reserve Mining Co.	Beaver Bay[1]	Magnetic taconite concentration	1955—1956
Erie Mining Co.	Aurora[1]	Magnetic taconite concentration	1955—1956

1. Minnesota.
2. Michigan.

Concentrating Plants Other Than HMS or Cyclone That Went Into Operation During 1952 Season in Lake Superior Region

Company	Plant	Type	Capacity[1]
Cleveland Cliffs	Hawkins Fines Retreat	Hydrosizers, Humphrey Spirals	125
M. A. Hanna	Spring Valley	Wash	200
Oliver-Iron Mining Div.	Hull Rust	Wash	600
Pickands Mather	Scranton	Wash	300
Reserve Mining Co.	Babbitt	Magnetic Taconite Concentration	
Zontelli Bros.	Manuel	Wash	400

1. Rated in long tons per hour.



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Kennecott Subsidiary Options Scheelite Claims

Kennecott Copper Corporation's wholly owned subsidiary, Bear Creek Mining Company, has taken an option for $600,000 on 18 patented mining claims in Nevada's Jungo district. The company has plans for a large-scale diamond drilling program on the claims to determine the extent and grade of scheelite mineralization with the hope of developing sufficient ore tonnage to warrant large-scale mining and milling operations.

The mining claims are located on the east side of Washoe Lake, three miles east of Jungo, and were originally located by George J. Hunt of Carson City. Bear Creek optioned the claims from the Gold Corporation of America who had previously leased the claims from Peter J. Burfening who, in turn, had optioned them from Hunt.

The Gold Corporation has carried on a surface and underground exploration campaign on the claims and conducted a number of metallurgical tests on the ore.

James Boyd, former director of the U. S. Bureau of Mines, is exploration manager of Bear Creek with headquarters in New York. George W. Rust of San Francisco, California, is Bear Creek project manager at Jungo.

St. Anthony Property Sold to Magma Copper

Properties of the St. Anthony Mining and Development Company at Tiger, Arizona, have been sold to Magma Copper Company of Superior for 10,000 shares of Magma's capital stock. The St. Anthony lead and zinc mine was shut down last December because of the depressed market for lead and zinc and because of the excessive flow of water encountered at the 1,125-foot level.

Magma has no plans to reopen and operate the mine. The main objective in the purchase was to acquire St. Anthony's housing, dispensary with equipment, schoolhouse, store, office, warehouse and miscellaneous buildings which will be used by Magma's subsidiary, the San Manuel Copper Corporation, until the company's own townsite can be erected. The St. Anthony mill was sold to other interests and is being dismantled.

At the Magma mine proper, development of ore in the Far East area continues to confirm important orebodies. Between the 2,700- and 3,000-foot levels, for example, 259,000 tons of ore assaying 7.8 percent copper, 1.4 ounces of silver, and 0.048 ounces of gold per ton have been proven. In addition, 30,864 tons of ore assaying 4.96 percent copper were shipped to the mill from this area.

DMPA PURCHASE CONTRACT TO MIAMI COPPER CO. FOR MORE PRODUCTION

Production of 230,000,000 pounds of refined copper is expected to result from a contract signed by Miami Copper Company of Miami, Arizona, and the Defense Materials Procurement Agency. The copper will be recovered from an undeveloped deposit of low-grade ore, averaging only 10 pounds of recoverable copper per ton of ore, and is an underground operation. The ore body in question extends out from the deposit of higher grade ore which the Miami company has been working since 1906 and which is nearing depletion.

Under the contract with DMPA, Miami Copper has agreed to undertake production at a guaranteed price of 27.35 cents a pound, f.o.b. Connecticut Valley. The only large expenditure involved will be the development of the new ore body itself, estimated at $3,000,000. The company will conduct this work at its own expense.

If the present operation, with its town and labor force, its plant and underground installations, were to close down, the cost of opening up the low-grade deposit at some future time probably would be prohibitive, said Howard I. Young, deputy administrator of DMPA. He also indicated that Miami's long experience in the development of low-cost methods of underground mining—especially block caving—was another important factor in the negotiation of the contract.

Production from the undeveloped Miami deposit is expected to start during the first six months of 1955. The contract runs to June 30, 1962, but the company reserves the right to cancel if the new project becomes a losing proposition and the losses reach a stipulated point.

In addition to the 230,000,000 pounds of electrolytically refined copper, the deposit is expected to yield a considerable amount of molybdenum. Also, the government has an option on 120,000,000 pounds of refined copper from the present mine at the average market price for the month of delivery.

KAISER STEEL'S IRON OUTPUT SOARS

Iron ore production at the Eagle Mountain, California, mine of Kaiser Steel Corporation rose to 1,648,041 tons in 1952, an increase of nearly 25 percent over the previous year. In addition to setting a new yearly record in production from the blast furnaces (977,267 tons against 921,752 tons), Kaiser Steel also set an all-time high in monthly production of pig iron (as hot metal) with Blast Furnace No. 1 setting a new individual record of 46,006 tons. The photograph above shows the mining property, located about 60 miles east of Indio. Ba'd Eagle deposit is at the upper left, and the new North-South deposit is at the upper right. The latter will supply the needs of three blast furnaces for 25 years. The foreground shows the dormitories, trailers and houses. Railroad yards and ore loading area are in the center.

The *Globe-Miami Copper Zinc Corporation* is undertaking an extensive development program at its *Irene* mine near Globe, Arizona. The company was recently granted a Defense Minerals Exploration Administration contract for the project. Total value of the contract is $63,750, with the government's participation set at $31,875. The funds will be spent to deepen the Irene shaft to 800 feet, and to drive 150 feet of crosscuts and 350 feet of drifts in an effort to prove a commercial deposit of zinc. Reed Roberts, for many years active in mining operations in Mexico, has been employed as mine superintendent. Globe-Miami has been engaged in development of the Irene mine since last July, employing a crew of 18 men on a three-shift basis. The corporation is headed by James U. Fagan; Russell Wright is secretary-treasurer.

A complete geophysical survey is being made of a part of the properties of *Banner Mining Company* near Tucson, Arizona. *Geophysical Services Inc.* of Delaware is doing the work. Banner took over the *Mineral Hill* and *Twin Buttes* properties in the Pima Mining district two years ago and did exploratory work in 1951 under DMEA contract.

Freeman Lomalina and associates of the *Lomalina Mineral Development Company*, Tombstone, Arizona, are reported to be working a tungsten deposit, south of Benson. Initially, the organization's mill at Tombstone will be used, but if satisfactory recoveries can be made, construction of a plant at the mine is planned.

From 50 to 75 tons of gold ore are being mined daily at the *Goldfield* mine, north of Apache Junction, Arizona. All production is from the open pit which is being extended to the north. Operations are on a two-shift basis with eight men employed. The recovery plant consists of a ball mill, amalgamation plates, and flotation units. The property is owned by *Goldfields Mines Inc.*, but is operated under lease by K. W. Hebner of Mesa, and W. E. Landis of Apache Junction.

The *Linda K. Mining Company* is leasing the *Mildred No. 1* and *No. 2* manganese claims located in Yuma County, five miles east of Bouse, Arizona. The principals in the company are Sam Cochran and Jim Dale of Bouse. They are doing some development work, looking toward the production of manganese.

The *Thrasher* mine, 10 miles northeast of Morristown, Arizona, has been leased to Albert Pessin of Wickenburg, Arizona. He is unwatering and retimbering old workings for examination purposes. If amount and grade of ore found justifies it, he plans to put the property on a production basis. Ore values are in gold and copper. John Stone is mine superintendent, employing a crew of four men.

Centroid Mines, Inc. of Wenden, Arizona, is undertaking a program of diamond drilling. Plans call for drilling of 1,500 to 2,000 feet of hole in two locations. W. B. Harris is president and manager.

R. W. Thompson of Payson, Arizona is extending the 110-foot mine shaft on his *Delaware* property another 100 feet to develop three veins and water. The Delaware is one of the old patented properties, being patented in 1886. It is located about 6½ miles southwest of Payson. A crew of three men are employed.

Harry Maxwell and Cecil Burmister, both of Prescott, Arizona, have reopened the old *Burmister* manganese property 18 miles southeast of Mayer. The plan is to ship high-grade manganese ore to the Wenden (Arizona) Purchase Depot, recently opened by *General Services Administration*.

Approximately 125 tons of ore daily are being mined and milled by the *Hillside Mining and Milling Company* from its *Tungstona* mine, Bagdad, Arizona, and production is being stepped up as rapidly as possible. Mine work has been hampered by lack of adequate power, but with the extension of the power line from Bagdad to the mine all equipment is being electrified. Concentration of the ore is with tables, followed by flotation and magnetic separation to refine and separate the tungsten minerals. Wolframite is the principal product with a smaller percentage of scheelite, and both products are brought up to a prime grade to bring top prices. The ore also carries a small percentage of beryl, and tests are being made to determine a method of recovering the beryl content which is lost in present milling. E. R. Dickie is manager of the company, and E. G. Green, superintendent.

The *Idaho Maryland Mines Corporation* of Grass Valley, California reports that 138,418 tons of ore were milled in 1952, yielding 39,730 ounces of gold and 11,942 ounces of silver, valued at $1,383,761. All leasing operations were discontinued last September, and there was no production from formerly leased areas of the mine while the changeover to company operation was being made. Production in December was reported to be the best of the year with operating expenses of $23,533. Recoveries continue to be good.

Carson Hill Gold Mining Company has sold its property at Melones, California to F. J. Stevenot, and has dissolved the corporation. The mine had been idle since WPB Order L208 and fire had destroyed much of the plant and equipment.

The *Kate Hardy* gold mine in the Alleghany district of California has been reopened after snow had been cleared from the mine access road. Lightning recently blew a transformer out in the mine, but it was repaired without having to remove machinery. In the same gold district, Robert Foley reportedly plans operations at the *El Dorado* mine, and W. F. Ray at *Seven Aces*. Harold Hahn of Grass Valley will operate the *Oriflamme* on Lafayette Ridge. The *Sixteen-to-One* mine is the state's largest producer of high-grade gold quartz, currently milling about 50 tons of ore daily.

Yuba Consolidated Gold Fields, Inc., an affiliate of *Yuba Manufacturing Company*, has launched a new gold connected-bucket-line dredge at Hammonton, east of Marysville, California. The $1,750,000 dredge will be one of six operating in that area. Rated as an 18-cubic-foot dredge, it will be used principally in digging at depths of more than 100 feet below the water level and will handle 7,500,000 tons of gravel a year. This may be the last dredge to be launched in California under present selling conditions of $35.00 an ounce for gold.

The lease for the tungsten property on the Morongo Indian Reservation in Riverside County, California was awarded to its two discoverers for $25 by the *Bureau of Indian Affairs* which had called for bids. The two Los Angeles prospectors, R. W. Harris and Dusan Milosovich, were the only bidders. Besides the cash bonus determined by the bid, the men must pay a 10 percent royalty to the Morongo Indians and rent on the property amounting to $1 per acre after the first three years. 430 acres are involved in the lease.

The *Palo Alto Mining Corporation* has constructed a custom mill for chrome ores six miles south of San Jose, California. The present flowsheet includes receiving bins, a jaw crusher, elevator, feeder, ball mill, jig, Wemco classifier, Diester table, and inclined-deck tables. The mill is currently making test runs on ore discovered in the hills north of Edenvale last year.

The *Cherry Creek Tungsten Mining Company's* mines and mills have been sold to G. P. Williams and associates of Idaho. The new group will work in close association with the *Baltimore-Camas Mines, Inc.* which Mr. Williams also heads. Ore from the Cherry Creek property will be shipped to the 100-ton Baltimore-Camas mill in Ely, Nevada. Some ore will also be processed at the smaller (30-ton) mill at Cherry Creek. The new owners plan to add additional mining equipment and possibly revamp the mill at Cherry Creek.

The 2,350-foot, four-compartment Fad shaft of *Eureka Corporation* has been repaired to the water level and core drilling has been in progress for some time in an attempt to locate ore deposits on or above the 1,700-foot level. Pumps are ejecting 3,600 gallons of water per minute from the shaft, and this may later be increased to 6,000 gallons per minute. Wilbur T. Stewart of the ground water division of the *United States Geological Survey* is studying the water problem. The company has launched a $3,000,000 dewatering program at this *Richmond-Eureka* property in Nevada, aided by a $750,000 government loan. Lead-zinc-gold-silver ore was disclosed some years ago at about a 2,350-foot depth by diamond drilling but a sudden inflow of water in 1949 caused cessation of development operations.

Gabbs Exploration Company has installed a primary crusher unit in its mill at Gabbs, Nevada. The new unit, which includes a Kue Ken Simplex jaw crusher and a Straub cone crusher, will treat the harder ores that have been contacted at lower levels in the mine. While reconditioning the mill, shaft sinking has been going on to reach the tungsten deposits indicated at lower levels by diamond drilling. Lee Dougan is president and manager of the firm.

The *Golden Arrow* and the *Golden Bar* mines in Nye County, Nevada about

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35 miles east of Tonopah have been purchased by John T. Whitaker and associates. Both are gold and silver producers developed by 500-foot shafts, laterals, and crosscuts. Mr. Whitaker is president of the *Nevada Mining Company* which is currently developing the *Good Kate* and *Amelia* claims in the Goldpoint district of Esmeralda County.

NEW MEXICO

Additions to the sulphate section of the present refinery are planned by the *International Minerals & Chemical Corporation* at its *Potash Division* in Carlsbad, New Mexico. The site of the new plant has been selected and construction will start shortly. Production from the new unit is expected by 1954. Improvements now being made in the headframe and hoist at the mine will boost ore hoisting capacity. A new 800-horsepower motor will be installed and coupled in tandem with the present 800-horsepower motor to provide extra power for the hoisting operation. Tying into this will be the installation of a new synchronous motor-generator set and new switch gear, to be housed in a new addition to the present hoist house at No. 1 shaft. New bottom-dump skips will be installed, and the shaft will be sunk deeper so that a clean-up elevator can be installed in the bottom of the pocket. The hoistman will also have a new, modern building where he will operate the completely electrically controlled hoist from a control panel which will give him a full view of the entire operation at all times.

The *Mex-Tex Mining Company*, operating in Socorro County, New Mexico, 35 miles east of San Antonio, produced 8,700 tons of high-grade barite concentrates and 425 tons of lead concentrates during 1952. About 25,000 tons of ore were milled at the company-owned mill at San Antonio. Mining is by open pit. Between 120 and 140 tons of ore are milled daily to produce gravity concentrates of galena and of barite.

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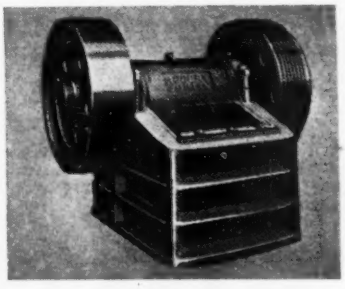

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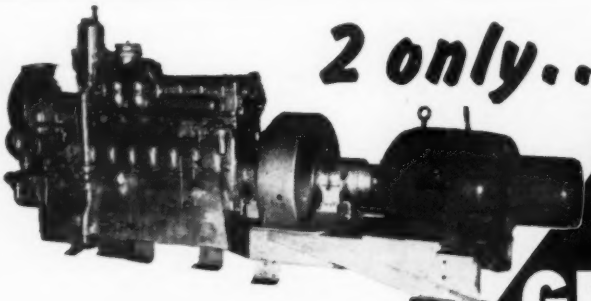

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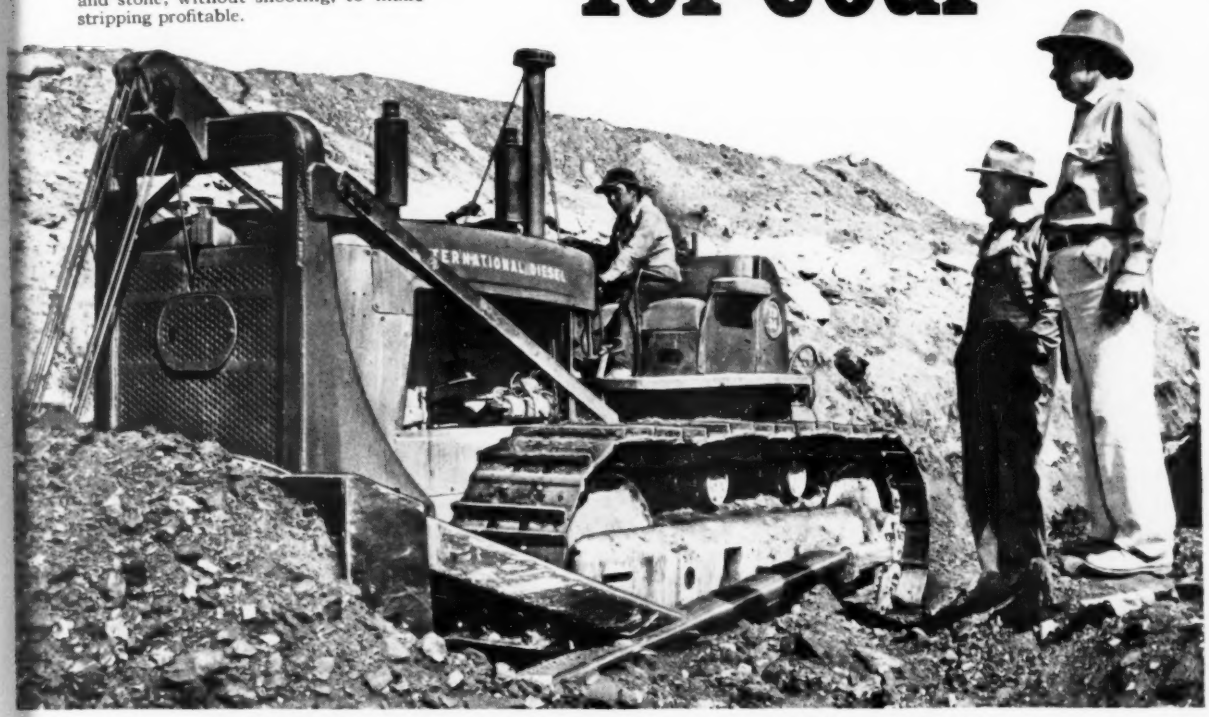

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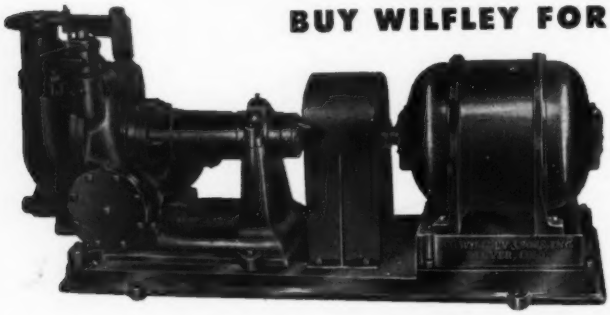

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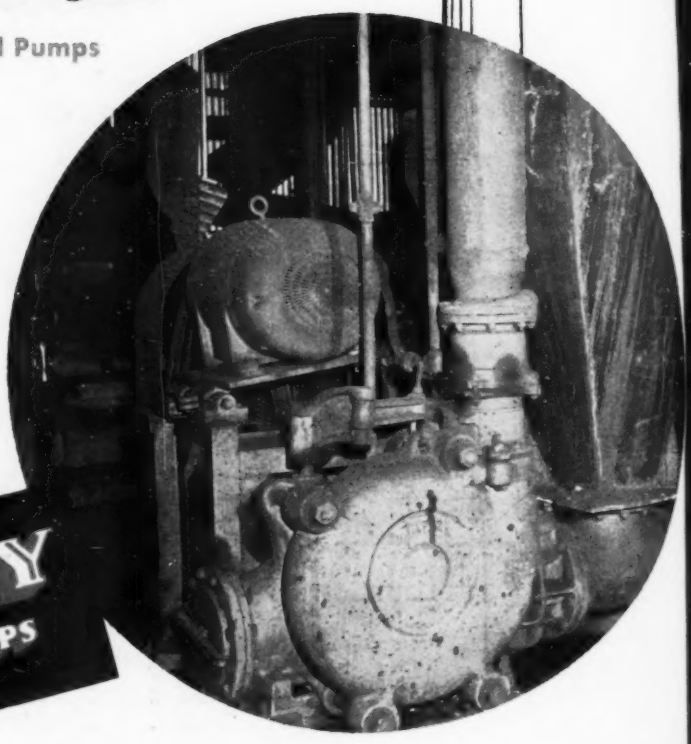

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